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MOTORS AND SENSOR CONNECTED TO PROFIBUS

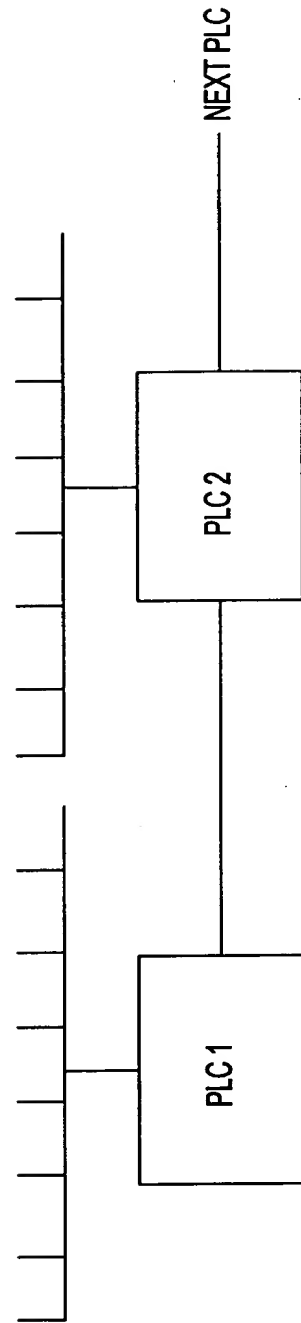


FIG. 1

(PRIOR ART)

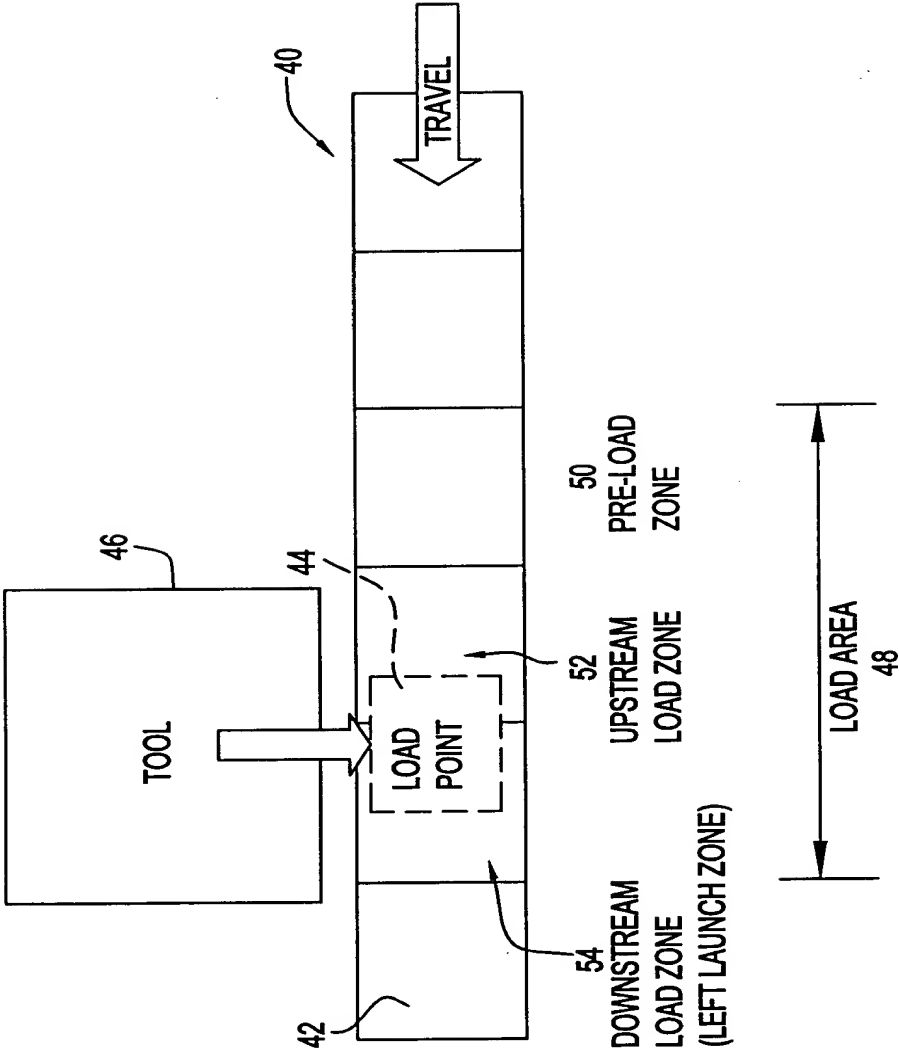


FIG. 2A

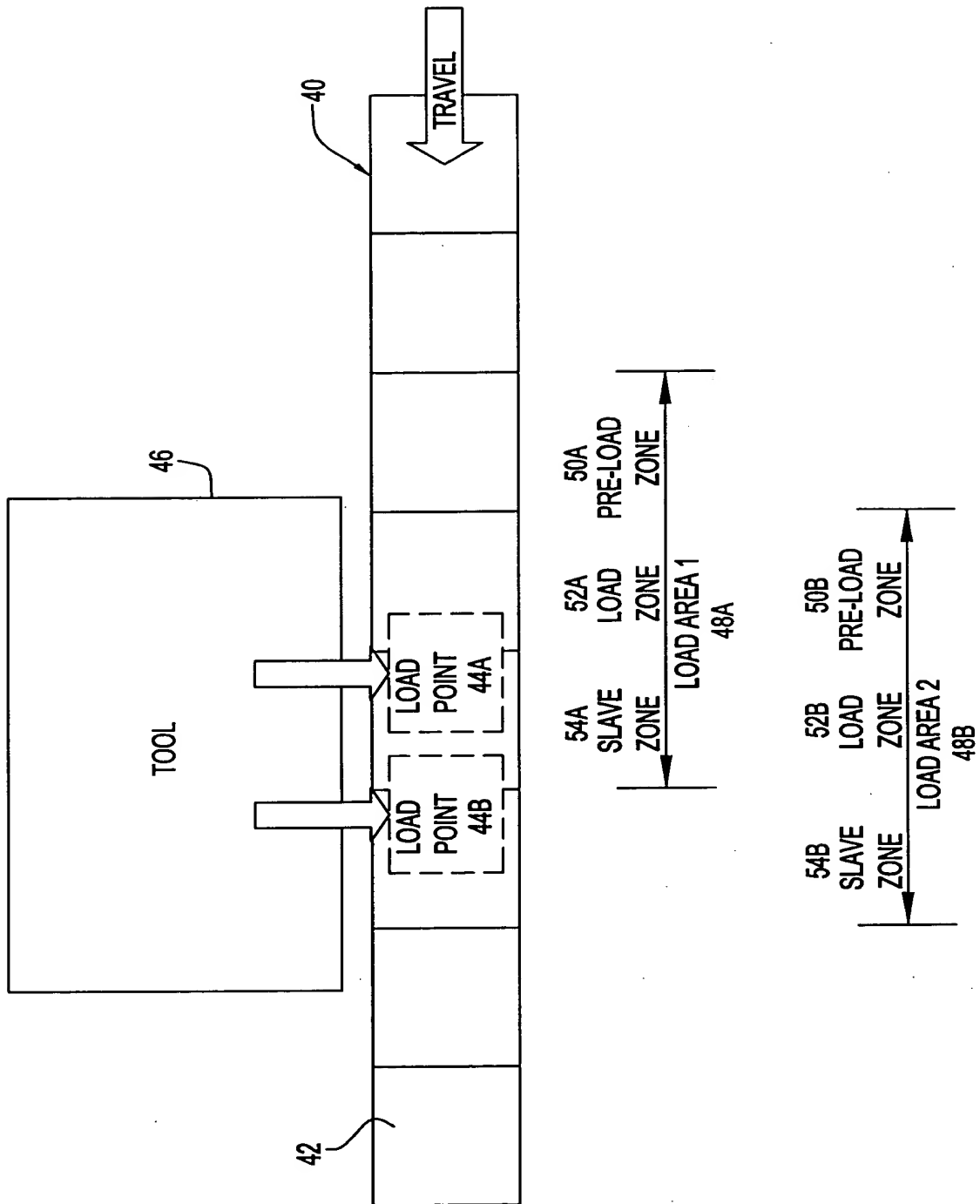


FIG. 2B

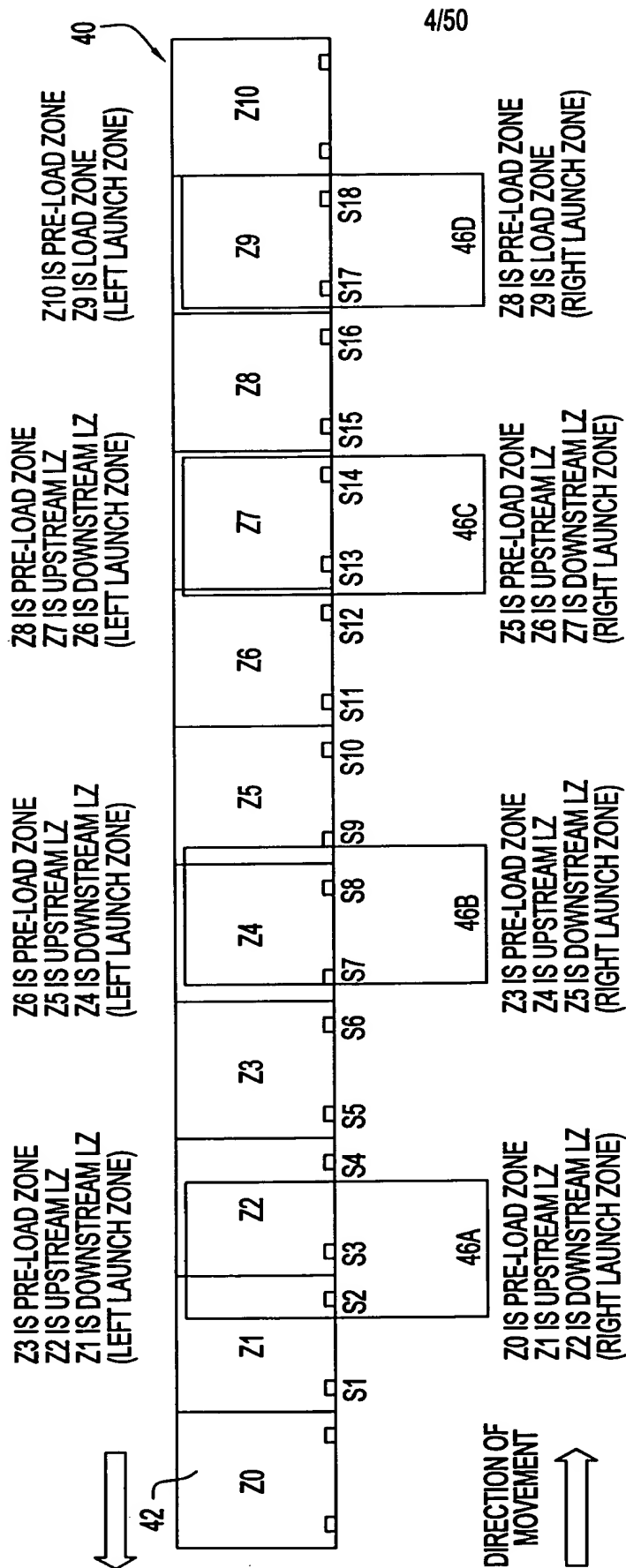


FIG. 2C

NEIGHBORHOOD FOR A RAIL ZONE

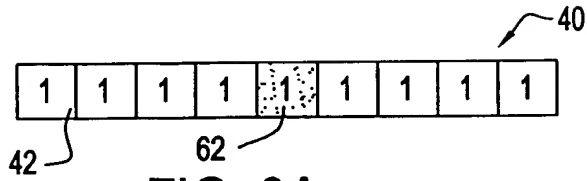
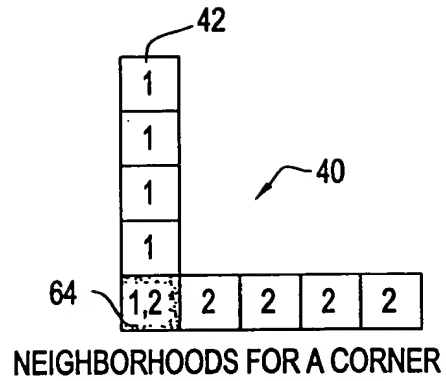


FIG. 3A



NEIGHBORHOODS FOR A CORNER

FIG. 3B

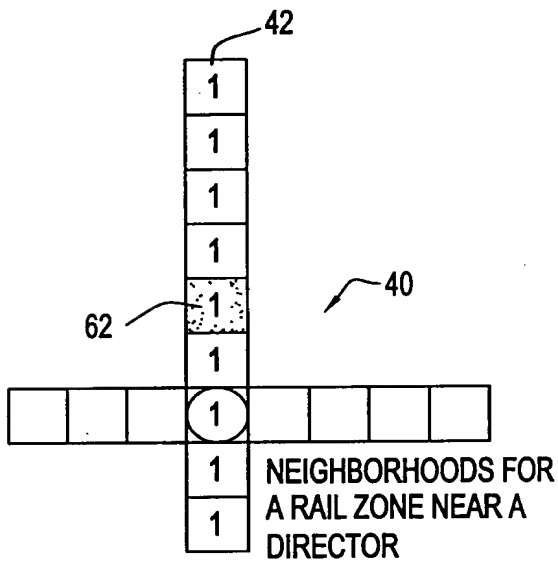
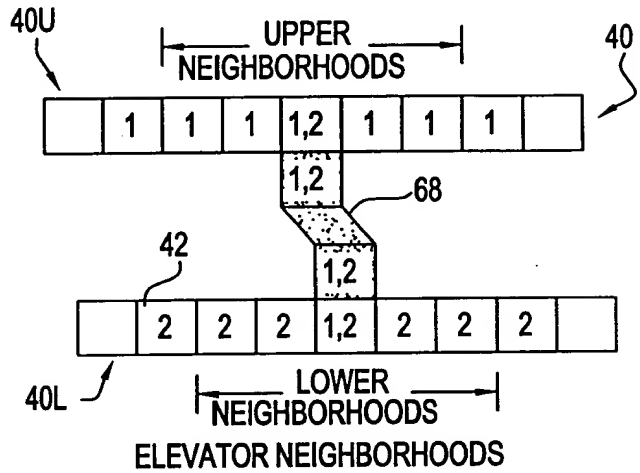
NEIGHBORHOODS FOR
A RAIL ZONE NEAR A
DIRECTOR

FIG. 3C



ELEVATOR NEIGHBORHOODS

FIG. 3D

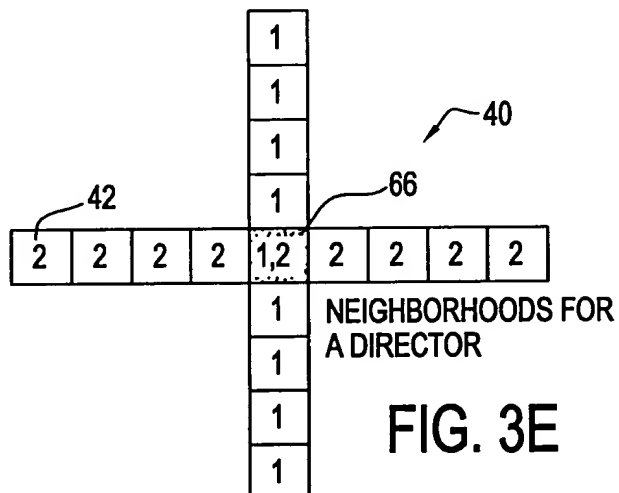
NEIGHBORHOODS FOR
A DIRECTOR

FIG. 3E

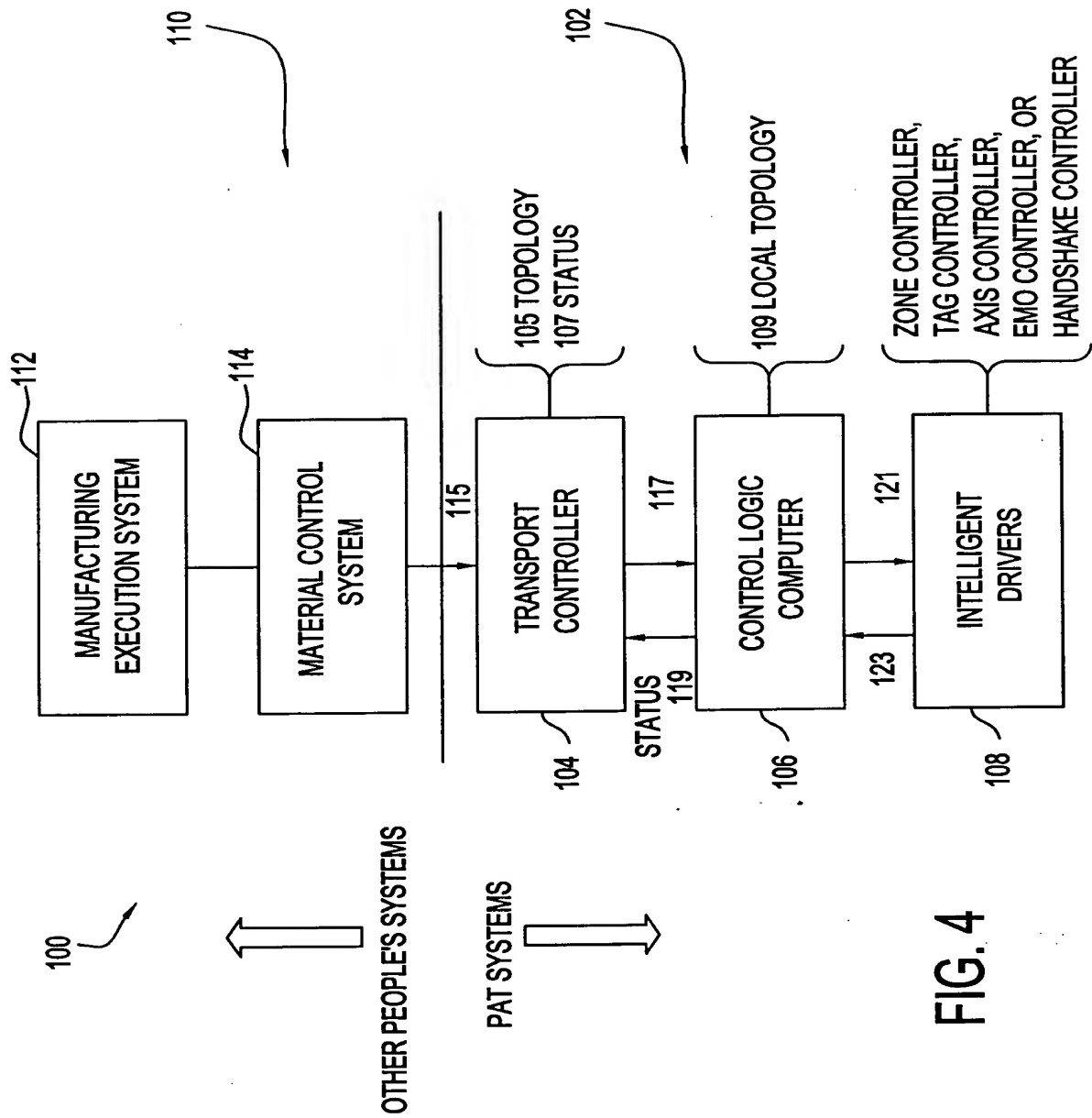


FIG. 4

CONVEYER RAIL WITH INTELLIGENT DRIVERS SHOWN

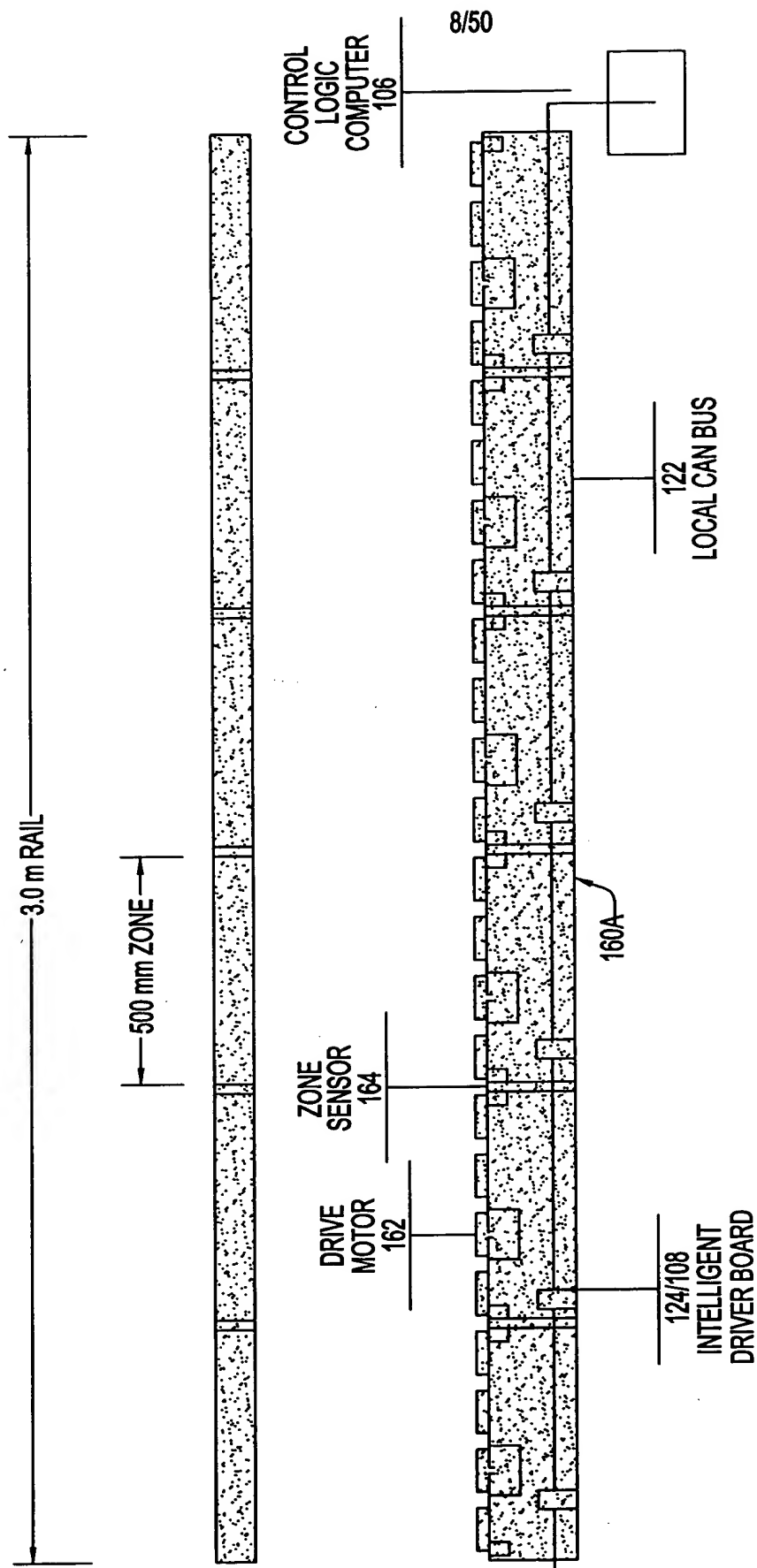


FIG. 5B



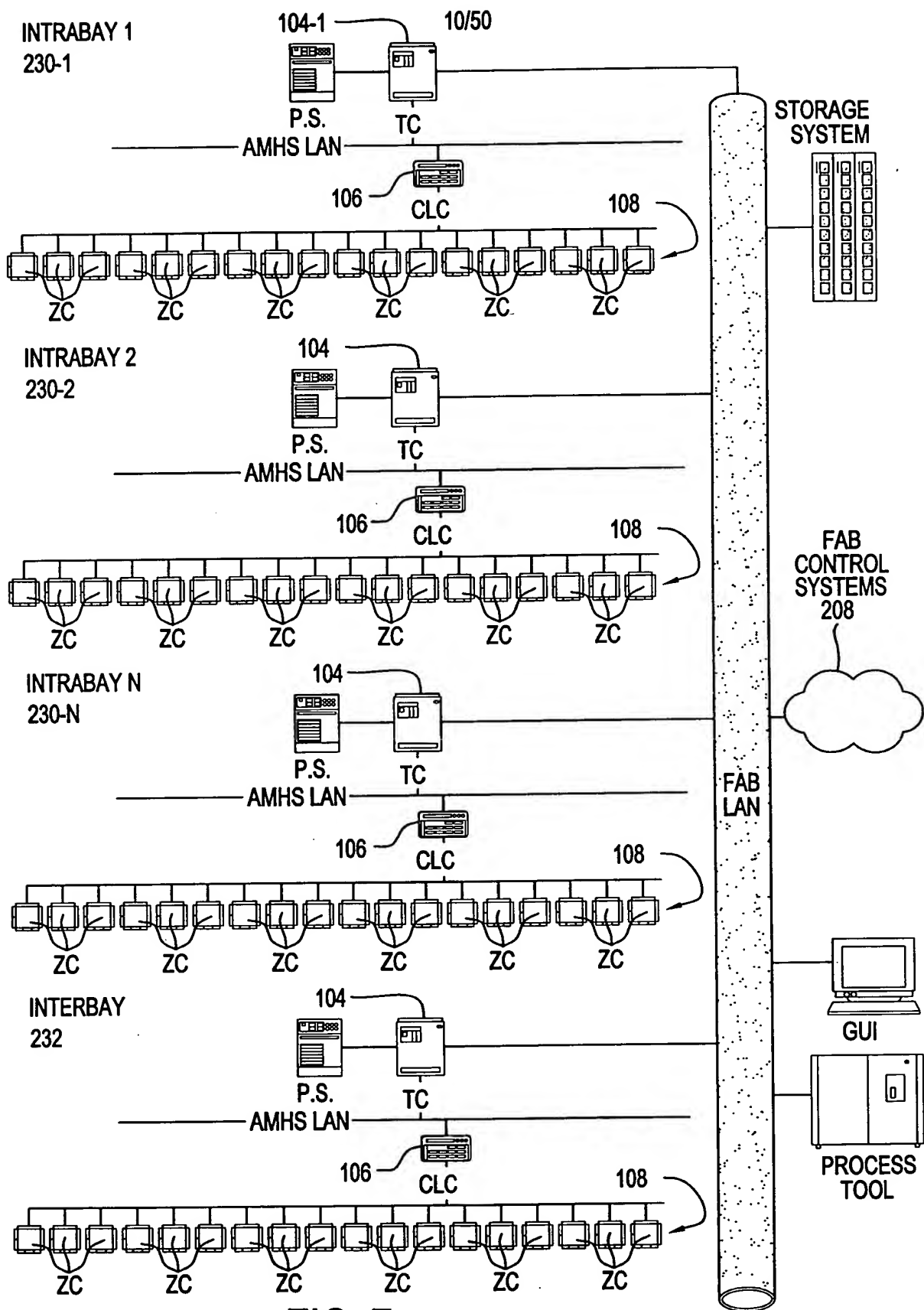


FIG. 7

104-1 10/50
 P.S. TC
 AMHS LAN
 106 CLC
 108
 ZC
 INTRABAY 2 230-2
 104
 P.S. TC
 AMHS LAN
 106 CLC
 108
 ZC
 INTRABAY N 230-N
 104
 P.S. TC
 AMHS LAN
 106 CLC
 108
 ZC
 INTERBAY 232
 104
 P.S. TC
 AMHS LAN
 106 CLC
 108
 ZC
 STORAGE SYSTEM
 FAB CONTROL SYSTEMS 208
 FAB LAN
 GUI
 PROCESS TOOL

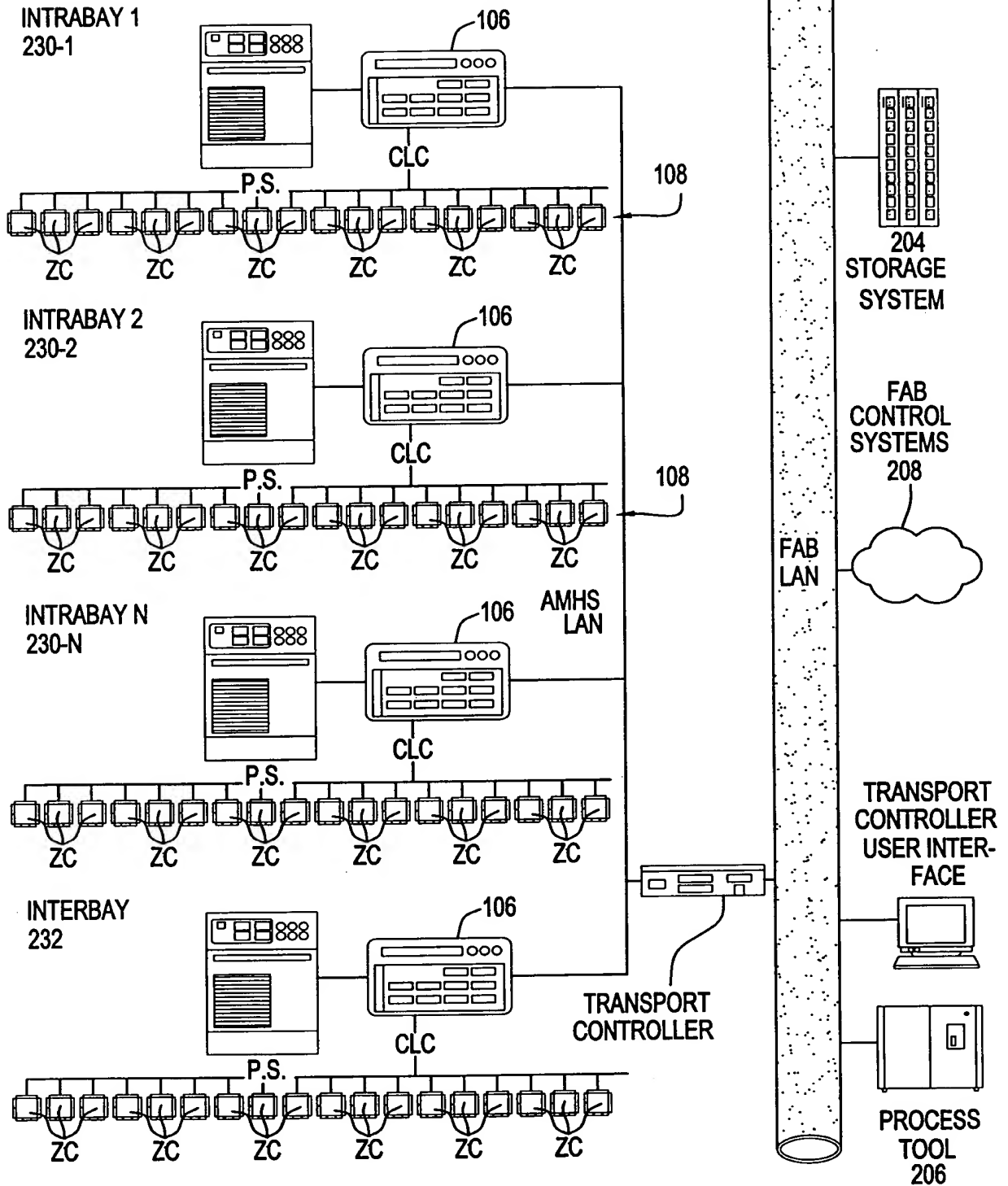


FIG. 8

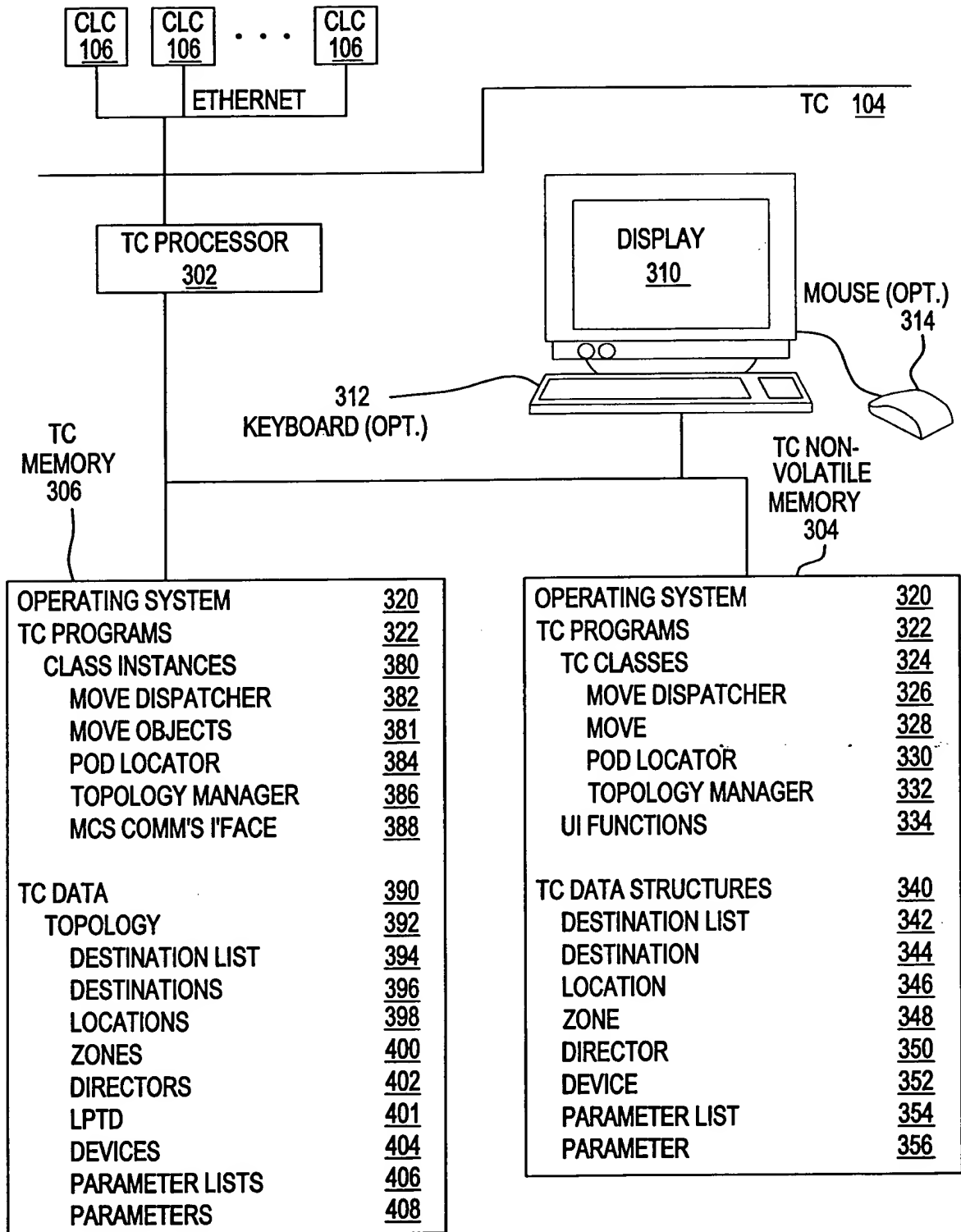
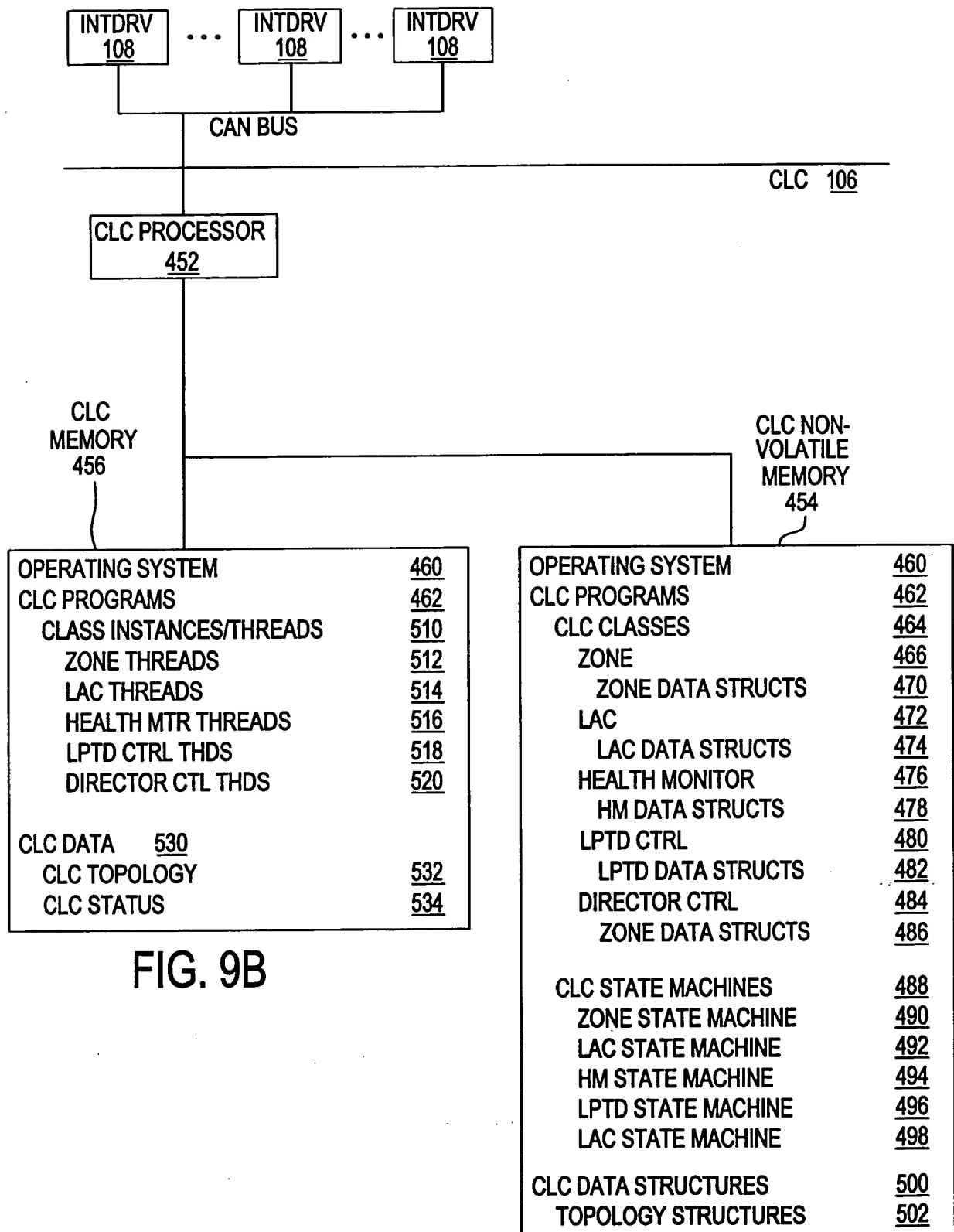
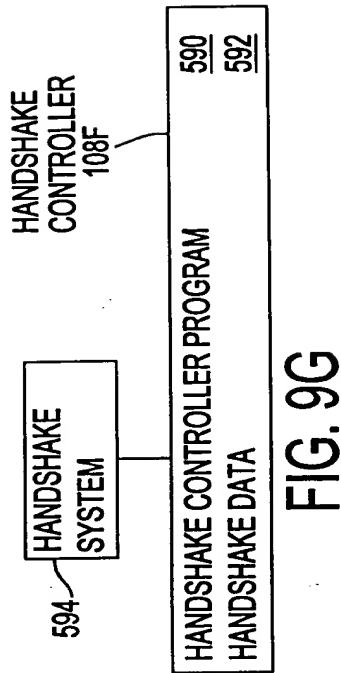
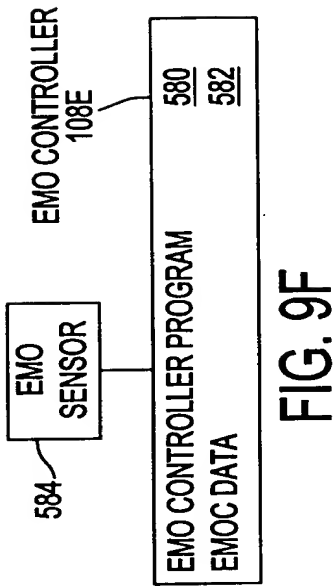
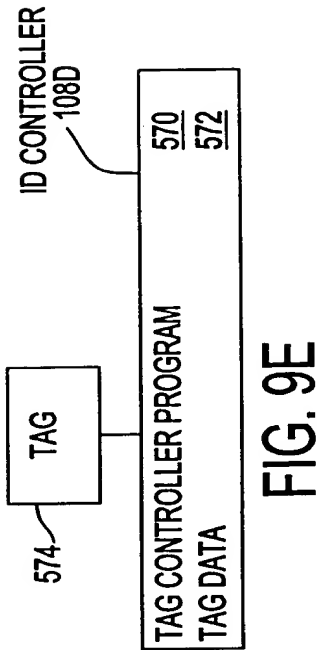
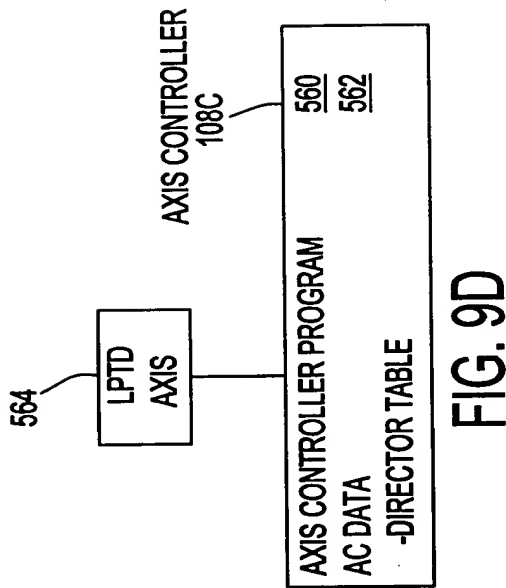
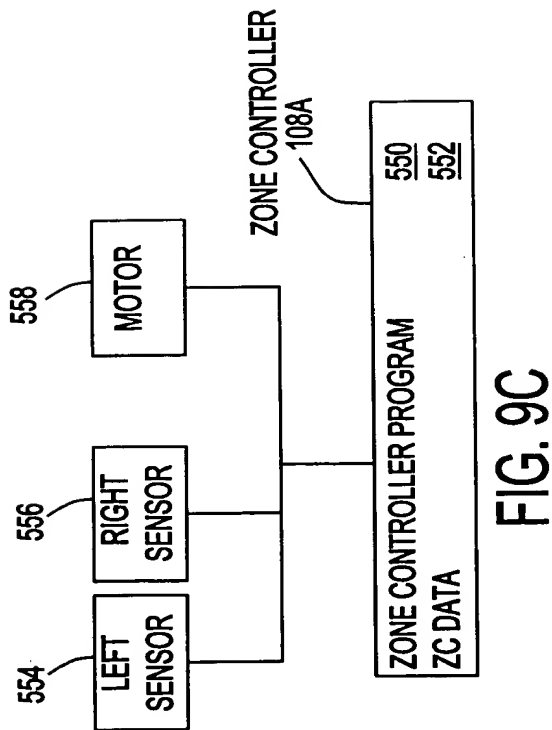


FIG. 9A





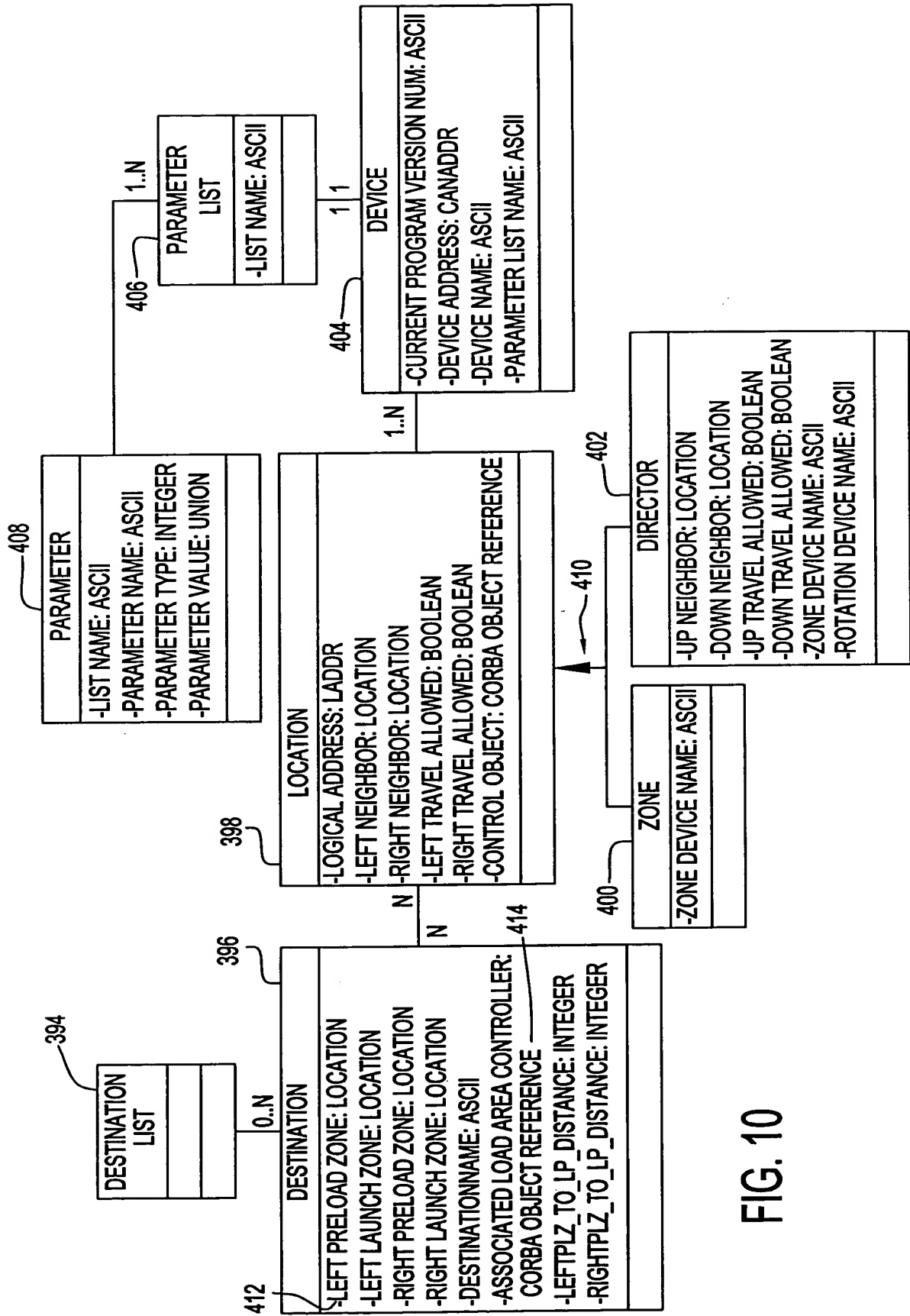


FIG. 10

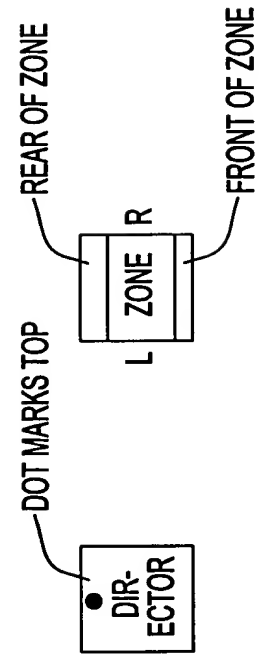
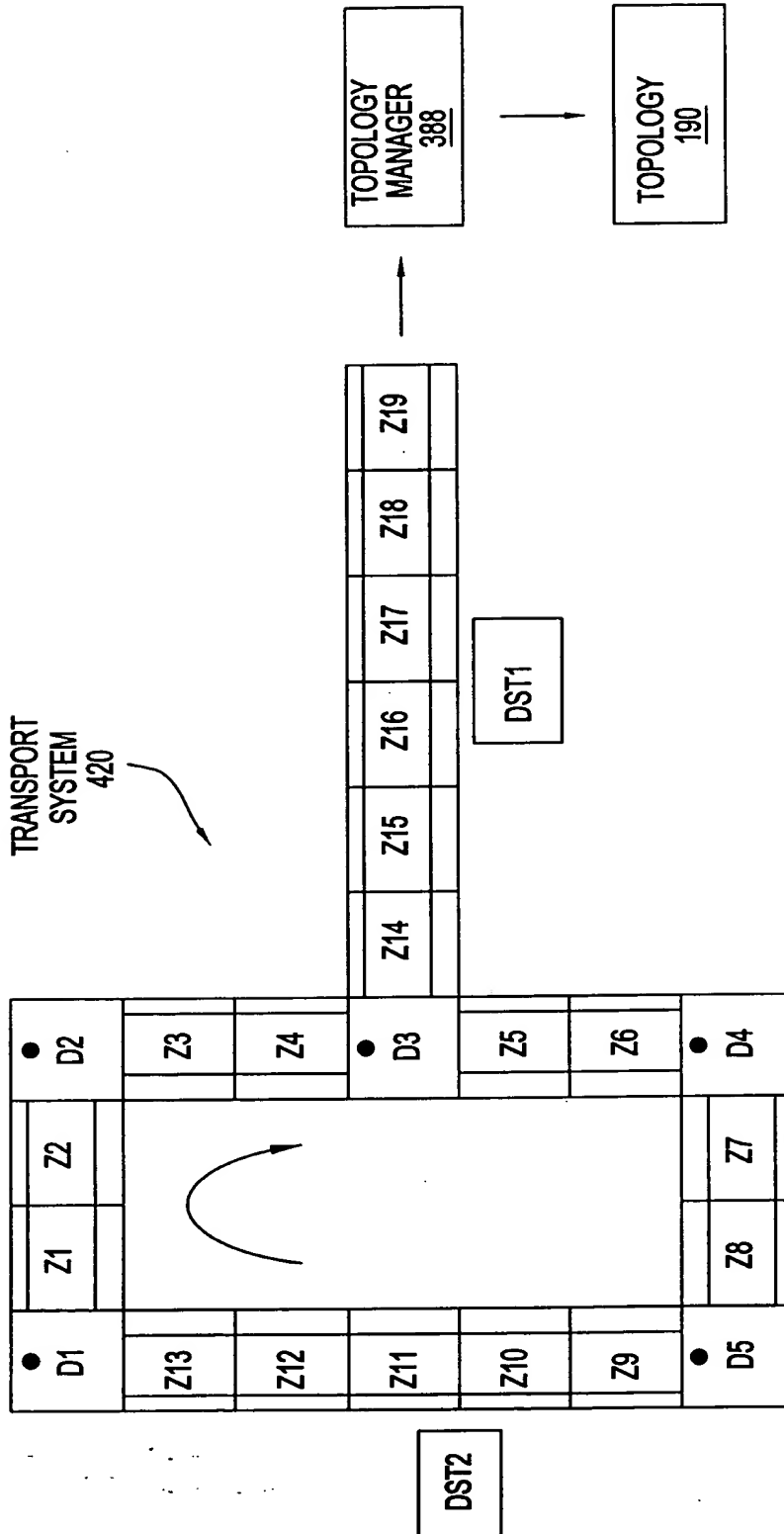


FIG. 11

TOPOLOGY
392

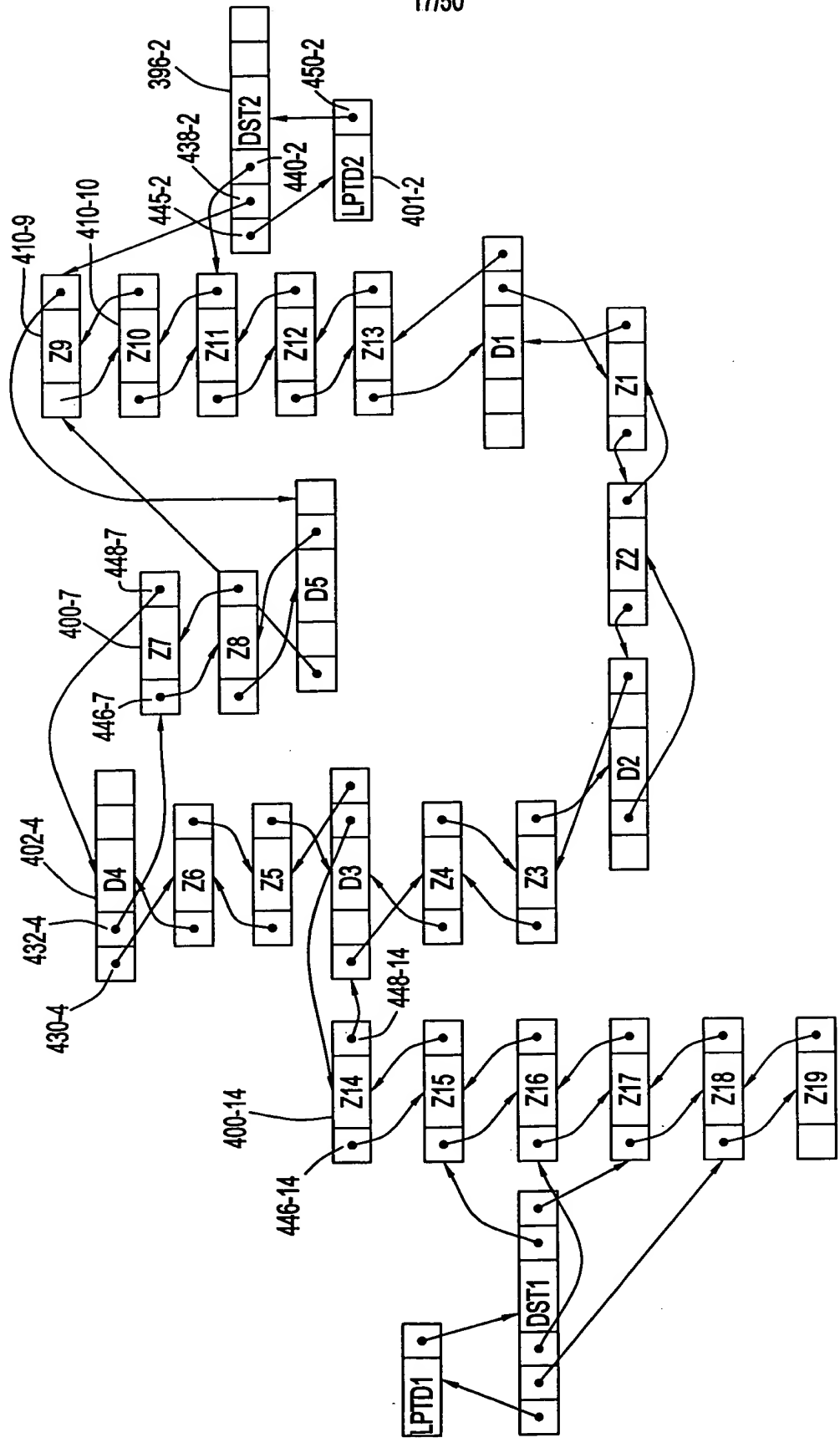


FIG. 12A

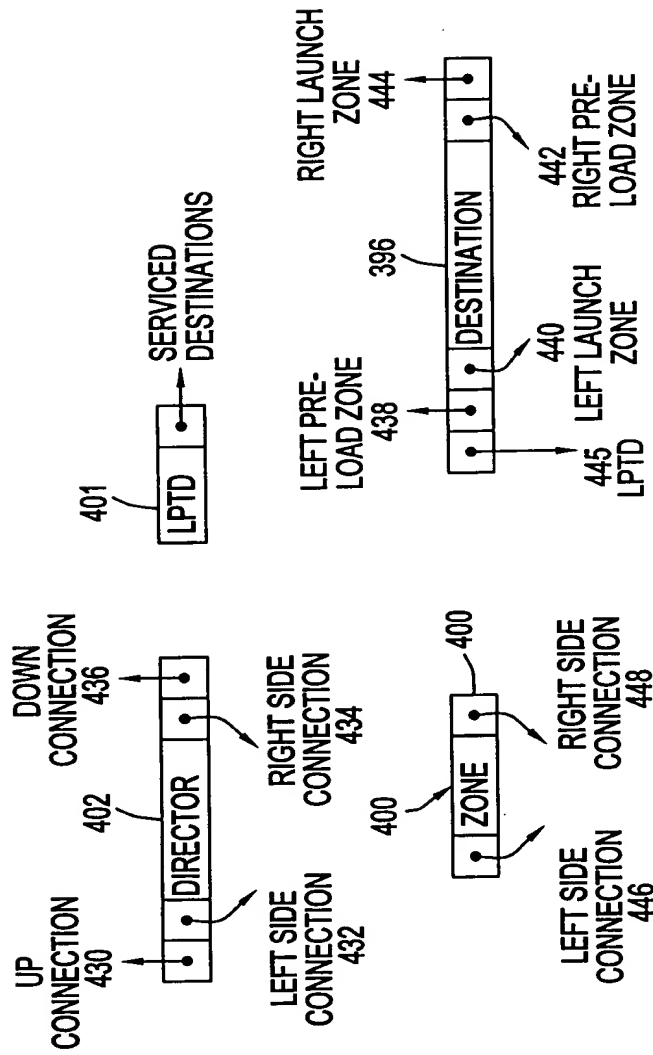
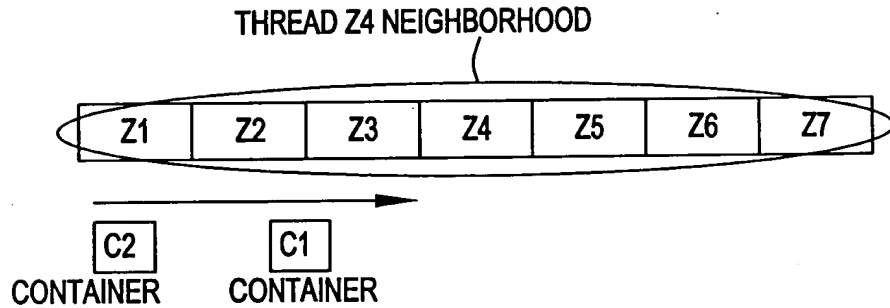


FIG. 12B



ZONE Z4 THREAD 512-4

ZONE STATE MACHINE	<u>620</u>
ZONE THREAD METHODS	<u>622</u>
ZONE Z4 DATA	<u>624</u>
NEIGHBOR STATUS:	<u>626</u>
ZONE Z1 STATUS	<u>628</u>
STATUS {CARRIER EXITING, CARRIER EXITED,	
CARRIER STOPPED, CARRIER REMOVED,	
ZONE AVAILABLE, ZONE RESERVED};	
MAXIMUM SPEED;	<u>630</u>
ZONE Z2 STATUS	<u>632</u>
ZONE Z3 STATUS	<u>634</u>
ZONE Z5 STATUS	<u>636</u>
ZONE Z6 STATUS	<u>638</u>
ZONE Z7 STATUS	<u>640</u>
CONTAINERS QUEUE	<u>642</u>
CONTAINER C1	<u>644</u>
CONTAINER C2	<u>646</u>
NEAREST CONTAINER PTR (=C1)	<u>648</u>
...	
DOWNSTREAM SPEED TABLE;	<u>670</u>
UPSTREAM SPEED COMMAND;	<u>672</u>
MAXIMUM SPEED;	<u>674</u>
SPEED TABLE RULES)	<u>676</u>

FIG. 13

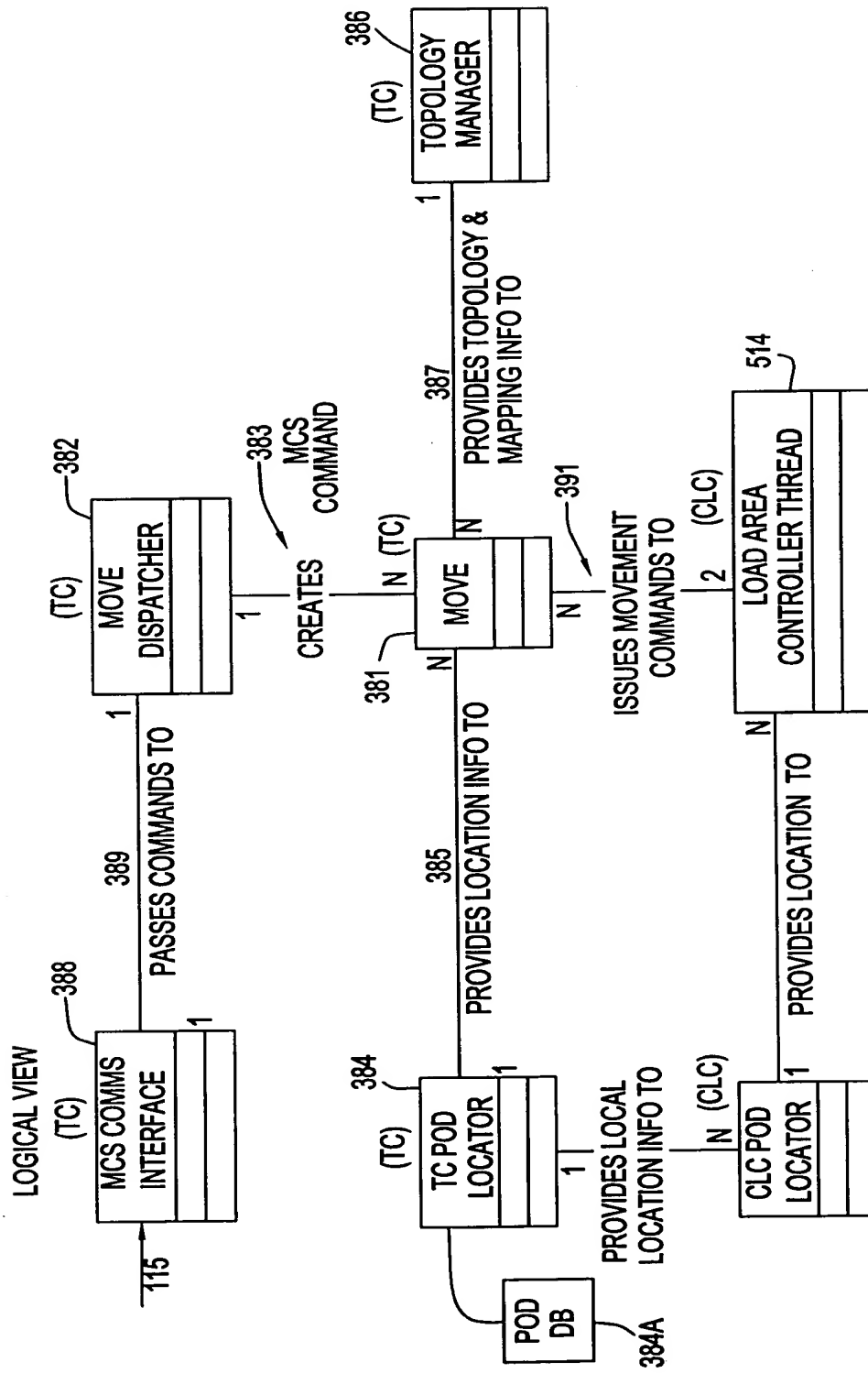


FIG. 14

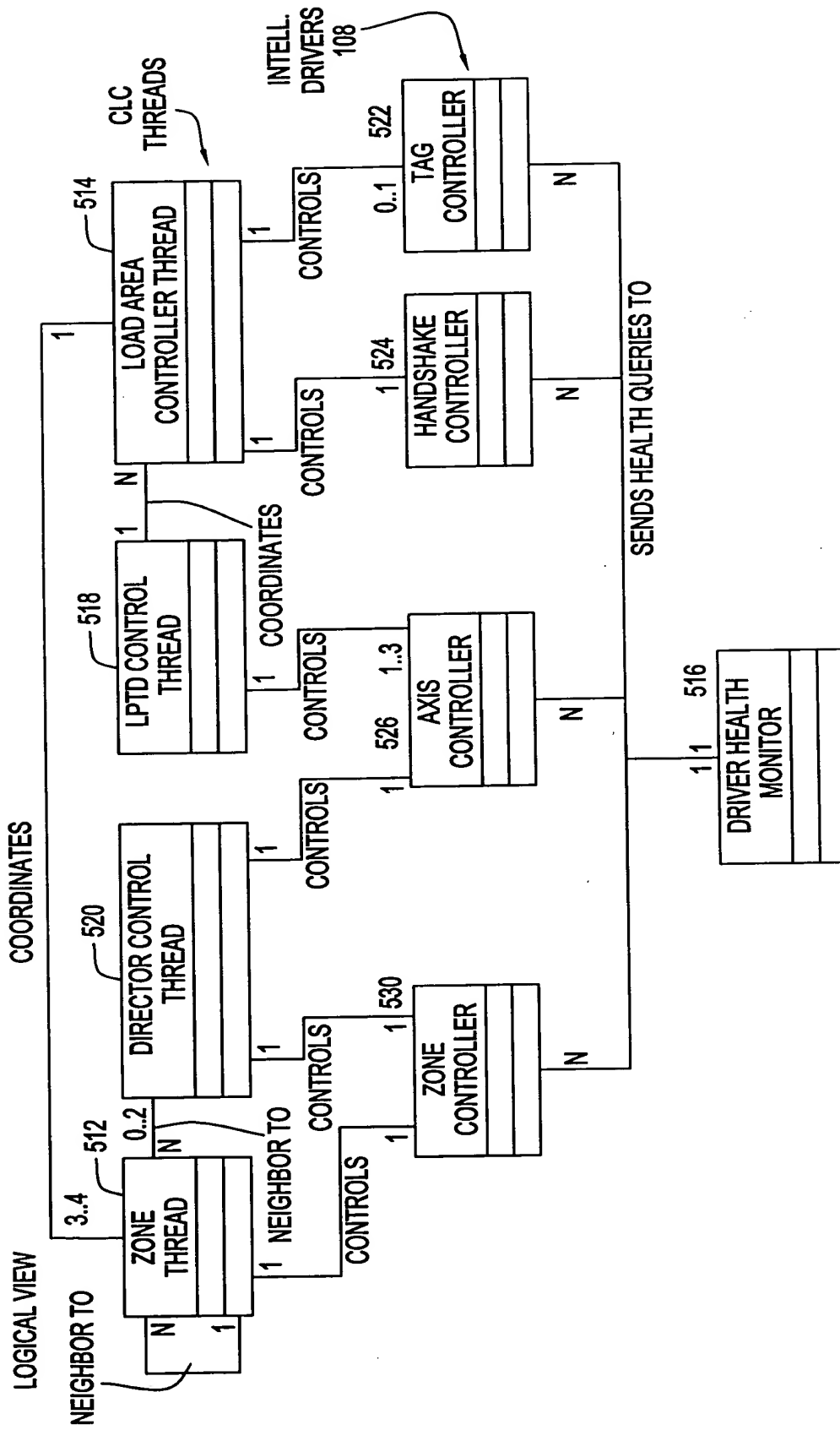
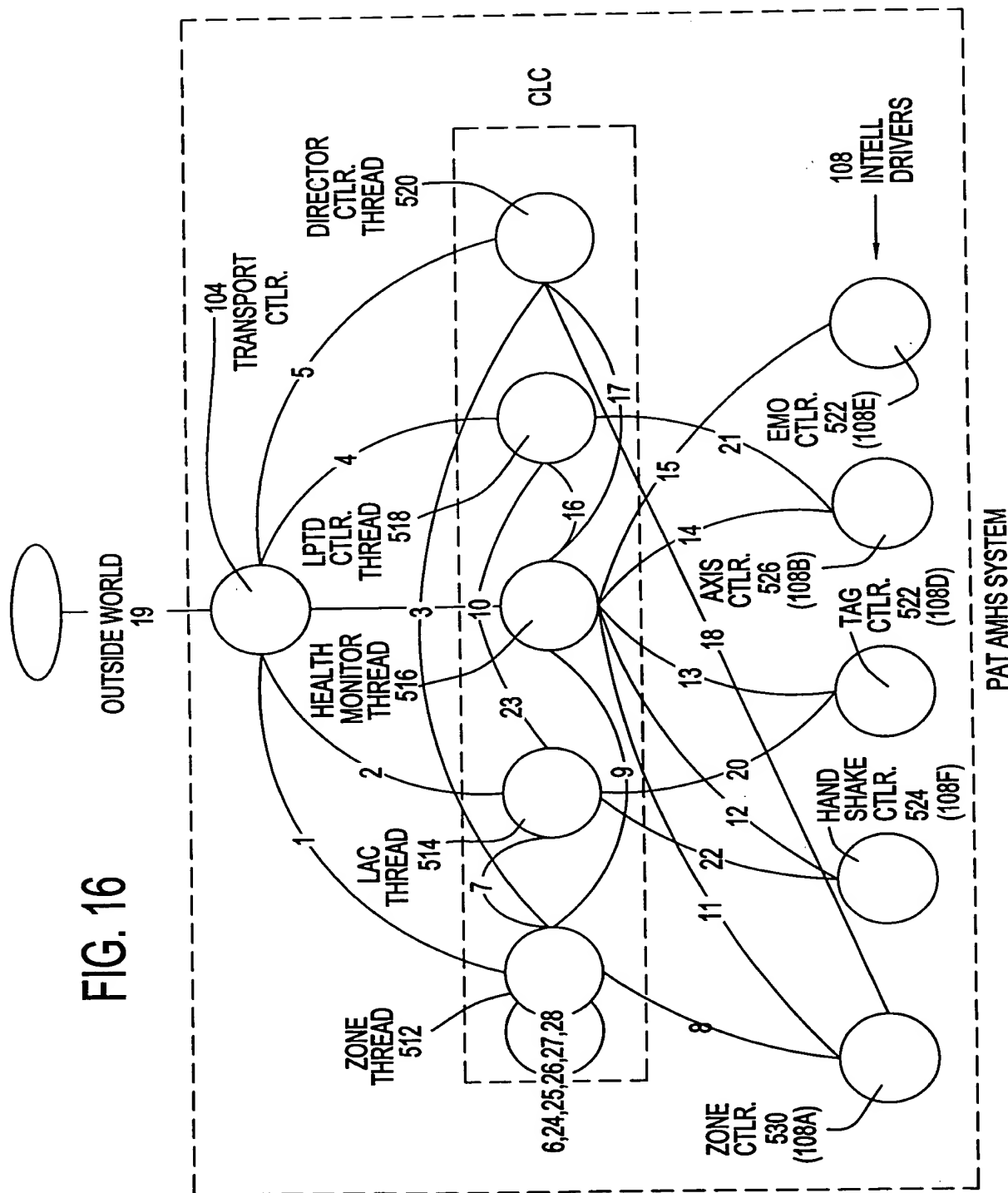


FIG. 15



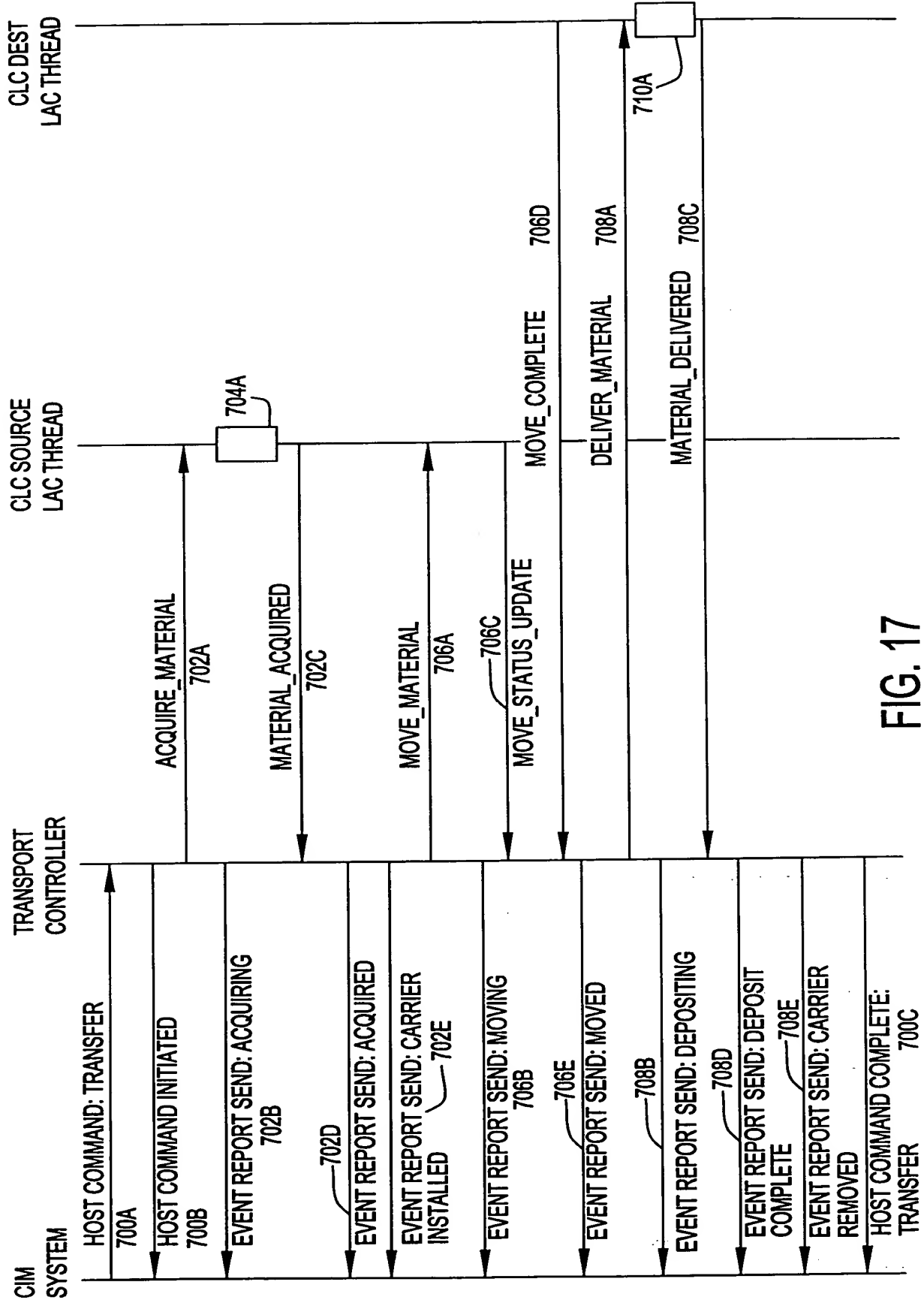


FIG. 17

FIG. 18 is a sequence diagram illustrating the communication between the Load Area Controller, Load Zone 1, Load Zone 2, Load Port Transfer Device Controller, and Handshake Controller.

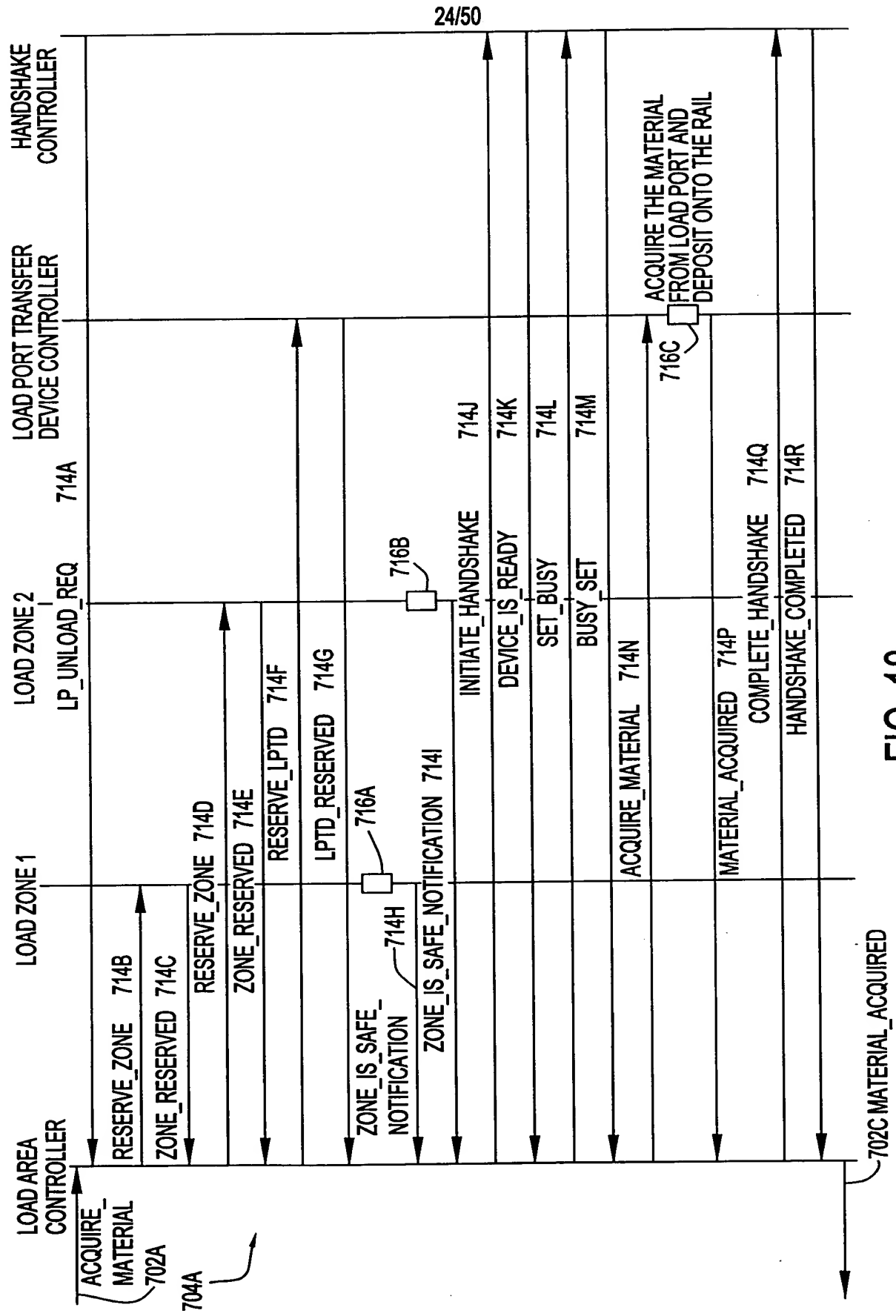


FIG. 18

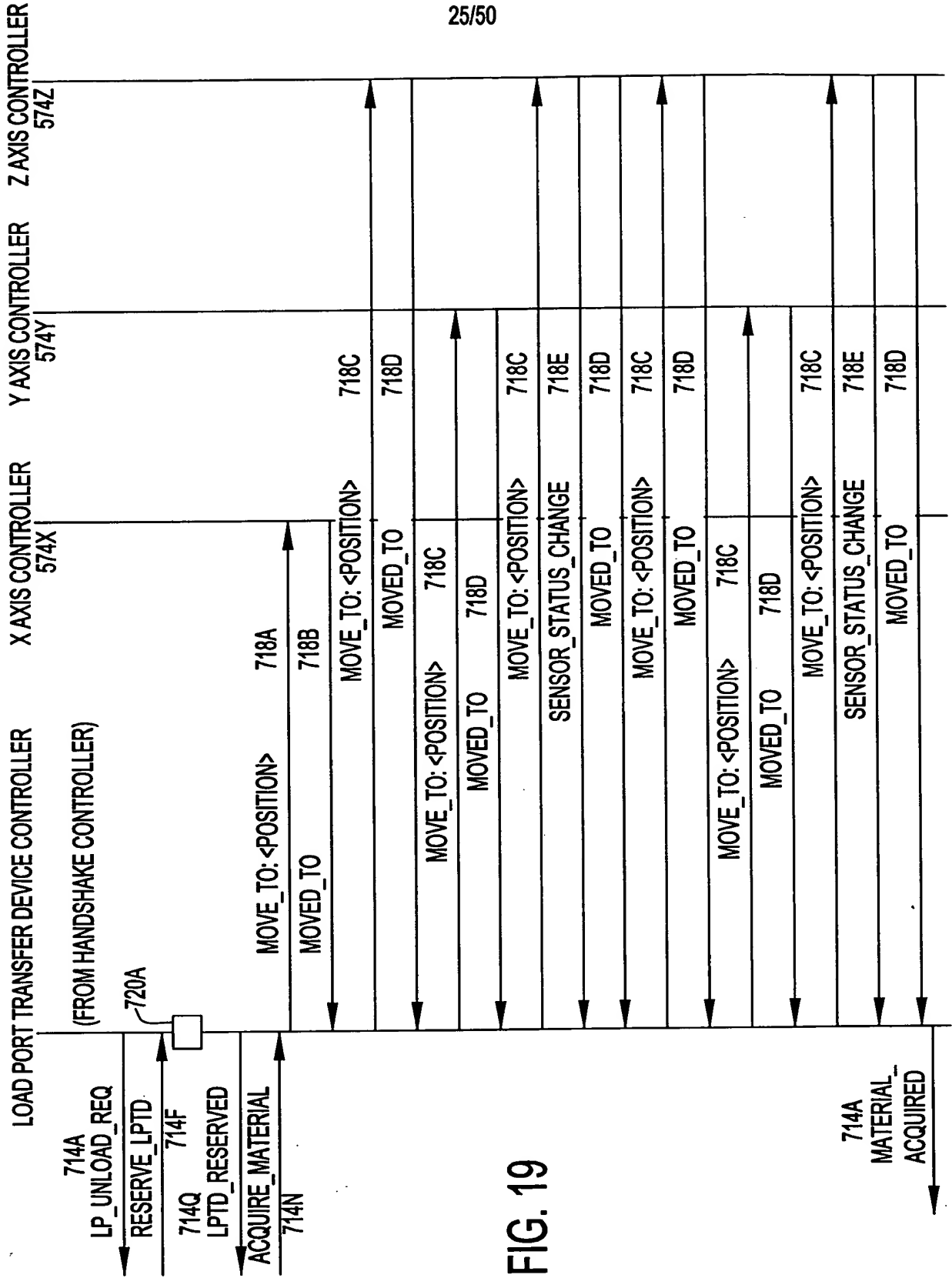


FIG. 19

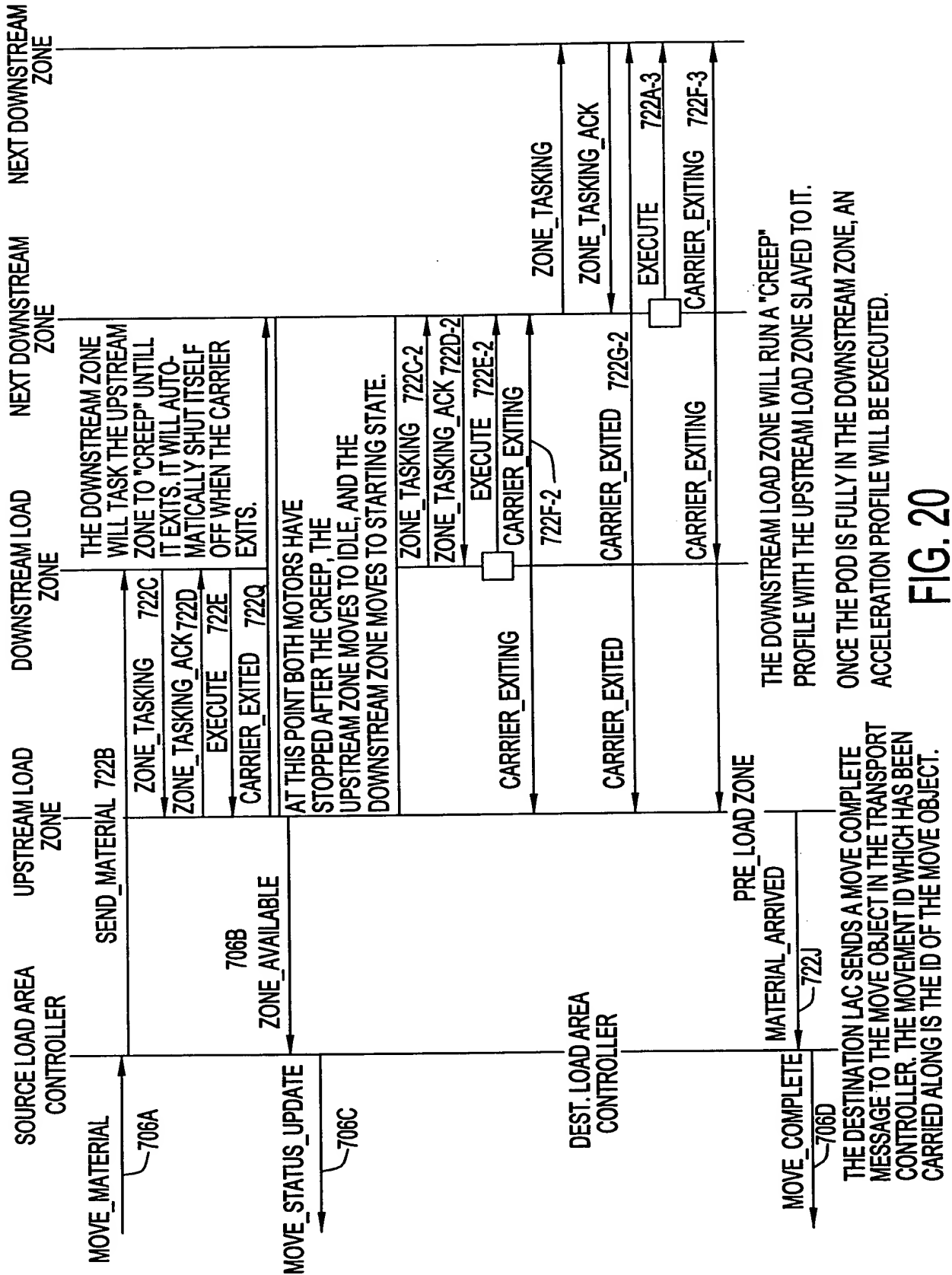
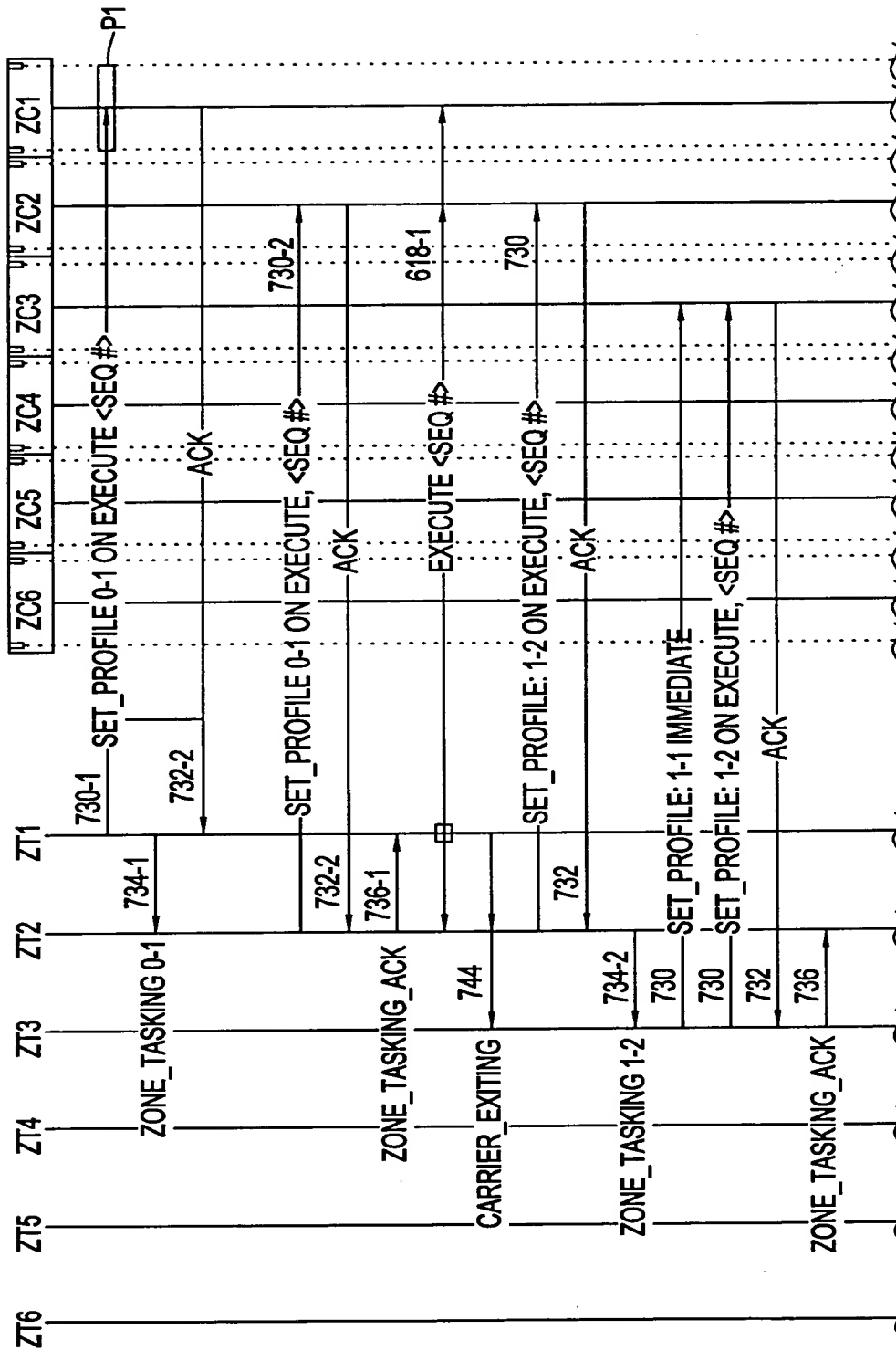
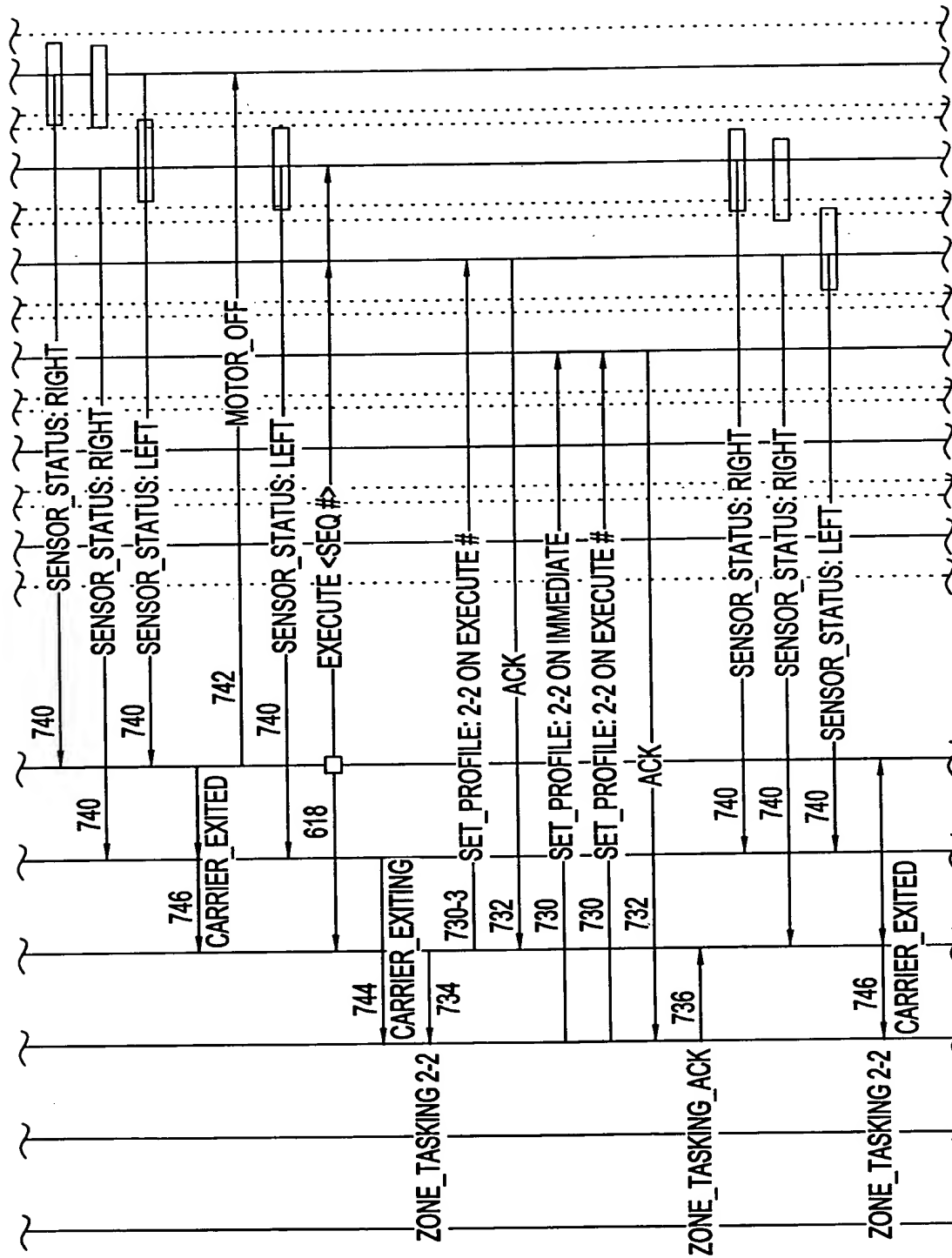


FIG. 20



CONTINUED TO FIG. 21B

FIG. 21 A



CONTINUED TO FIG. 21C

FIG. 21B

CONTINUED FROM FIG. 21B

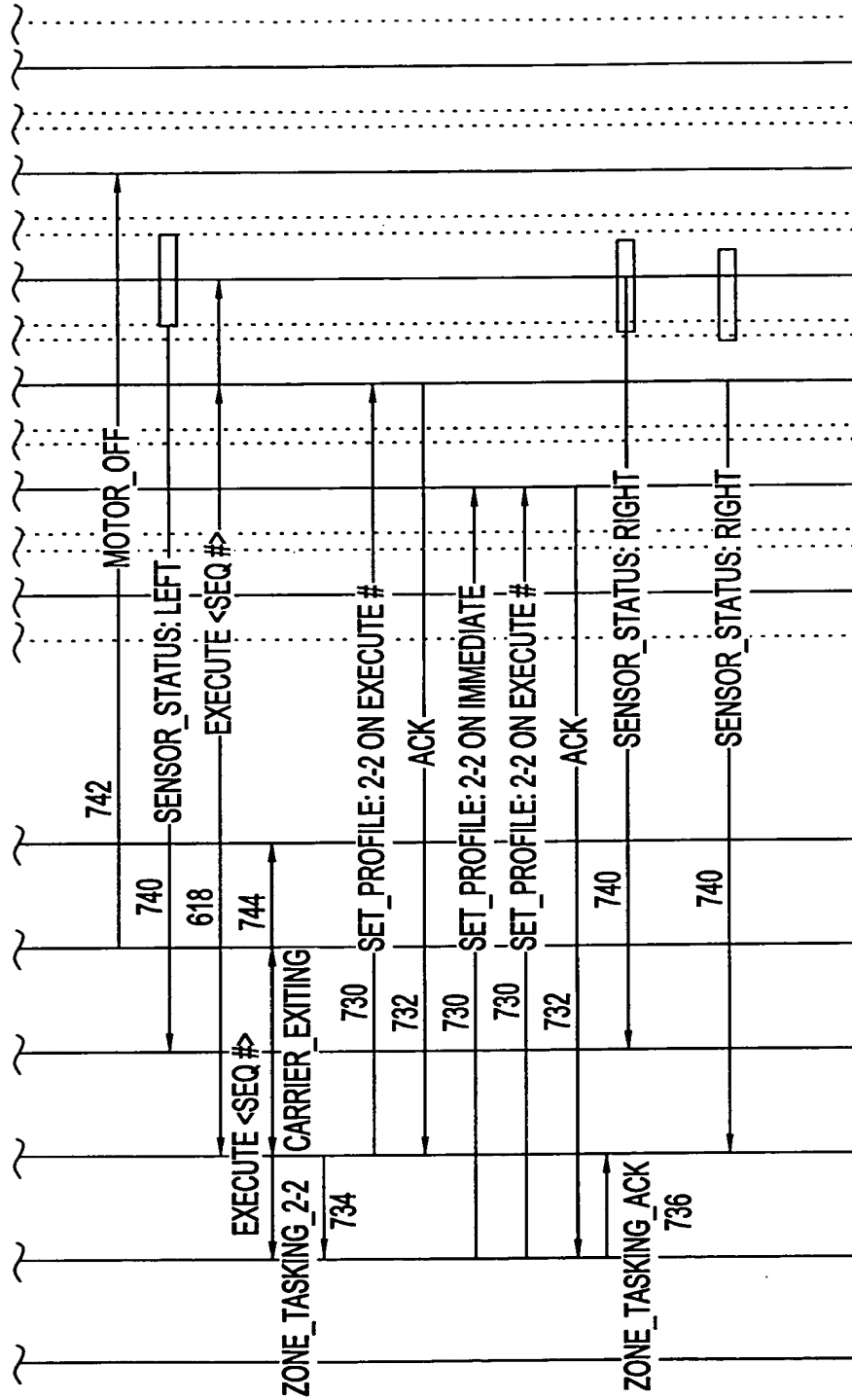
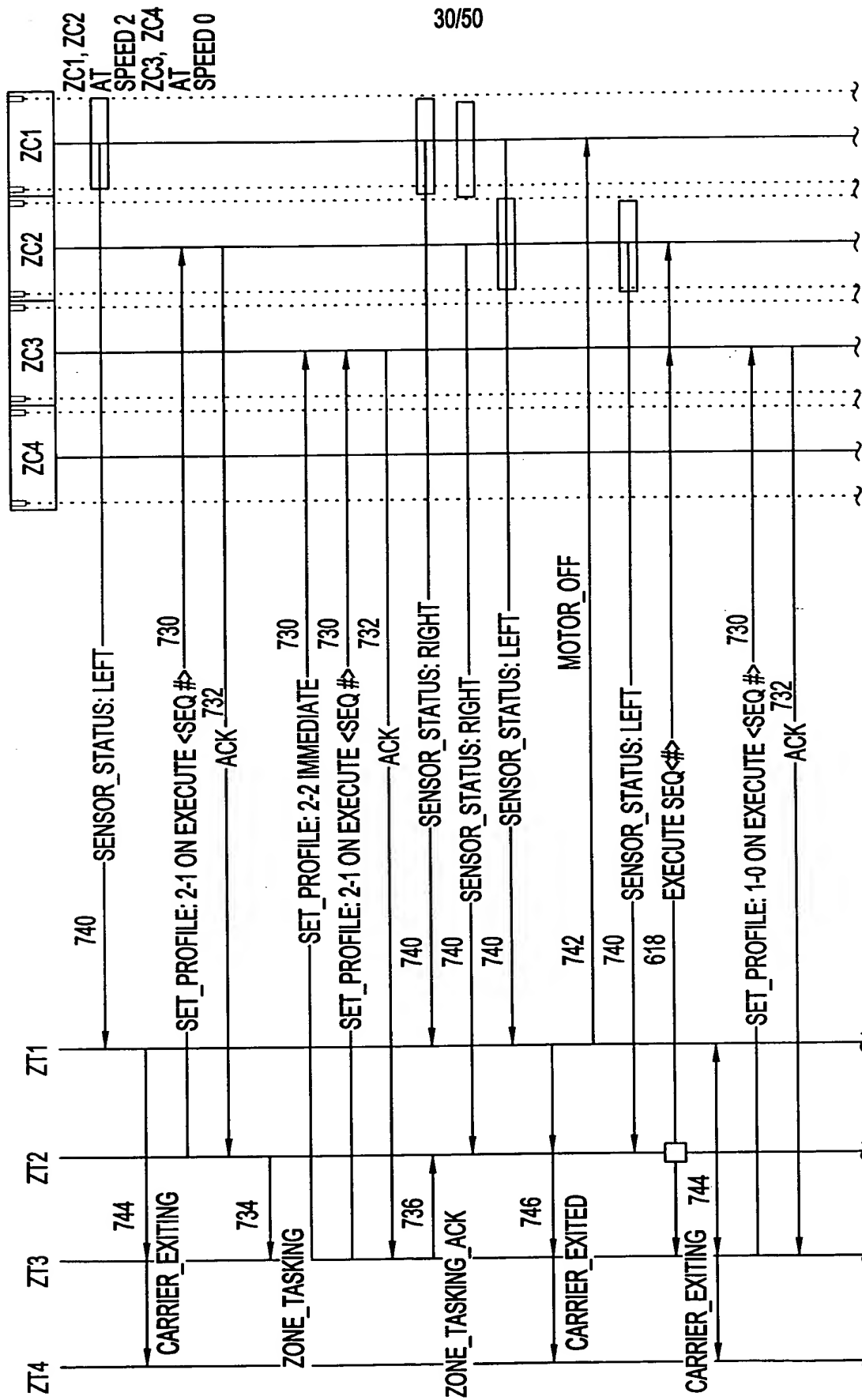


FIG. 21C



CONTINUED TO FIG. 22B

FIG. 22A

CONTINUED FROM FIG. 22A

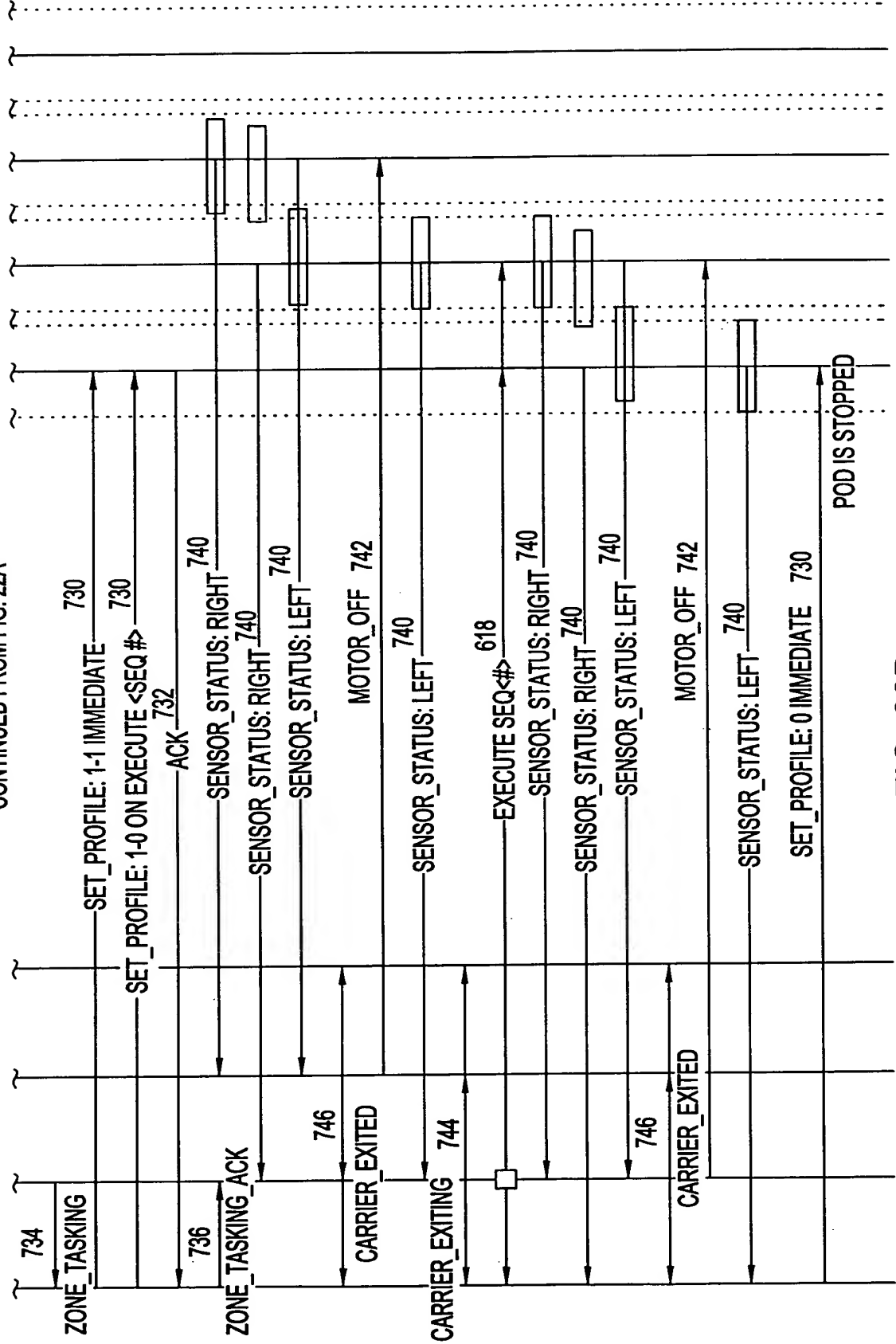
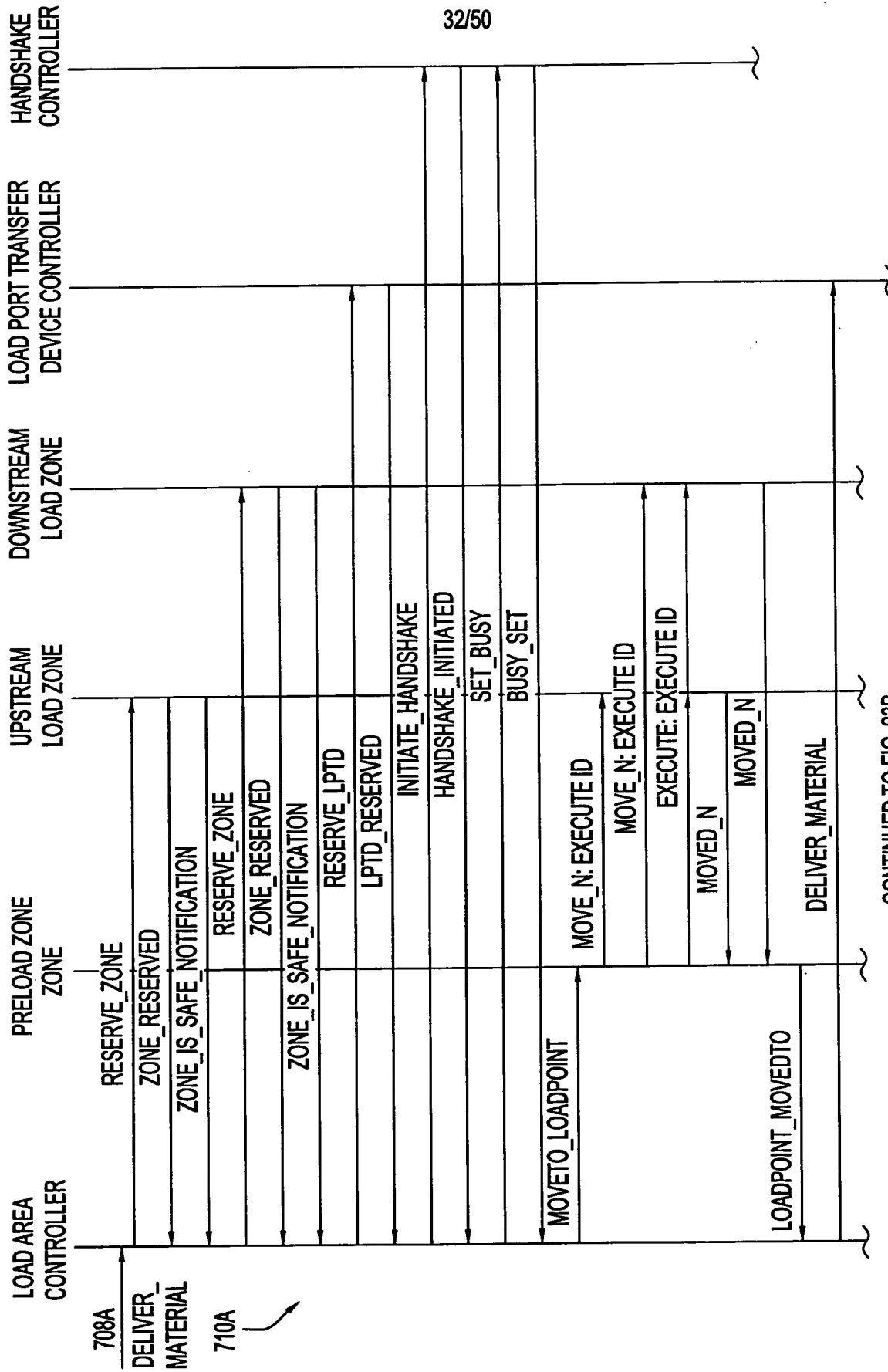


FIG. 22B

FIG. 23A is a sequence diagram illustrating a process for delivering material from a load area controller to a downstream load zone. The diagram shows the interaction between the Load Area Controller, Preload Zone, Upstream Load Zone, Downstream Load Zone, Load Port Transfer Device Controller, and Handshake Controller. The process begins with the Load Area Controller sending a 'DELIVER_MATERIAL' signal to the Preload Zone. This is followed by a series of 'RESERVE_ZONE' and 'ZONE_IS_SAFE_NOTIFICATION' signals between the Preload Zone and the Upstream Load Zone. The Upstream Load Zone then sends a 'RESERVE_LPTD' signal to the Load Port Transfer Device Controller. The device controller sends an 'INITIATE_HANDSHAKE' signal to the Handshake Controller, which responds with a 'HANDSHAKE_INITIATED' signal. The device controller then sends a 'SET_BUSY' signal to the Handshake Controller, which responds with a 'BUSY_SET' signal. The device controller then sends a 'MOVE_N: EXECUTE ID' signal to the Downstream Load Zone, which responds with a 'MOVE_N: EXECUTE ID' signal. The device controller then sends an 'EXECUTE: EXECUTE ID' signal to the Downstream Load Zone, which responds with a 'MOVED_N' signal. Finally, the device controller sends a 'LOADPOINT_MOVEDTO' signal to the Downstream Load Zone, which responds with a 'DELIVER_MATERIAL' signal.



CONTINUED TO FIG. 23B

FIG. 23A

CONTINUED FROM FIG. 23A

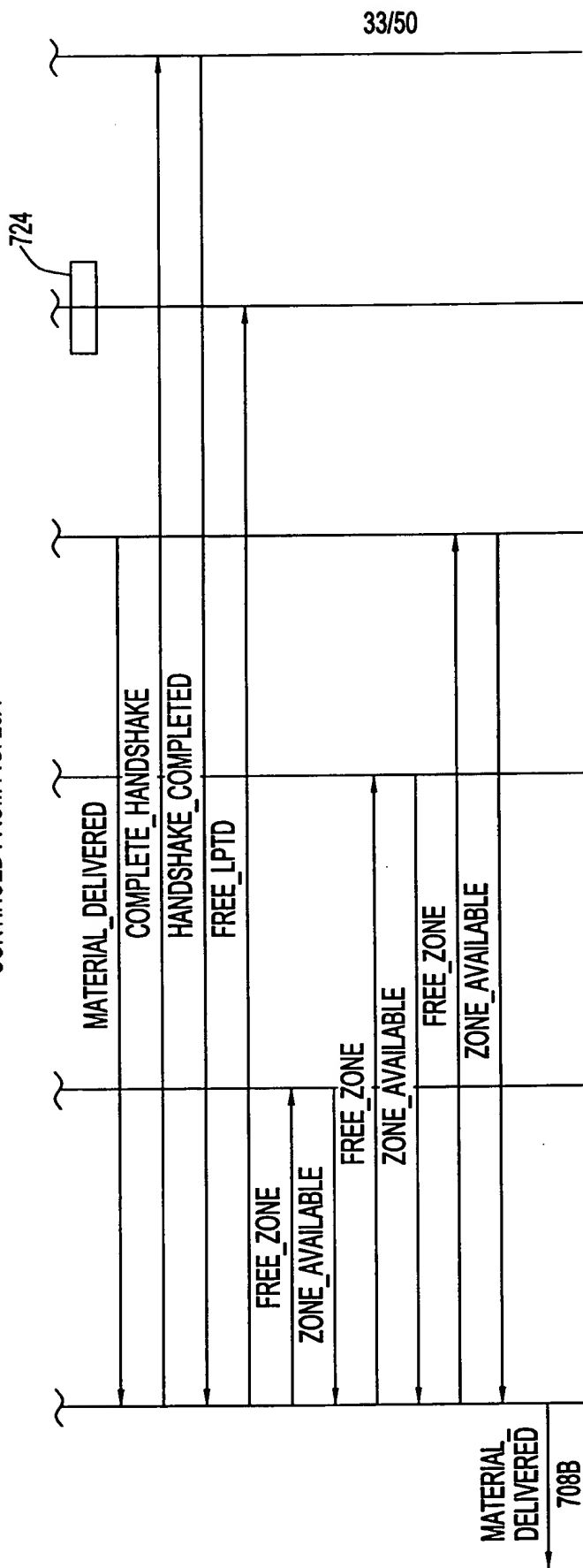


FIG. 23B

FIG. 24A

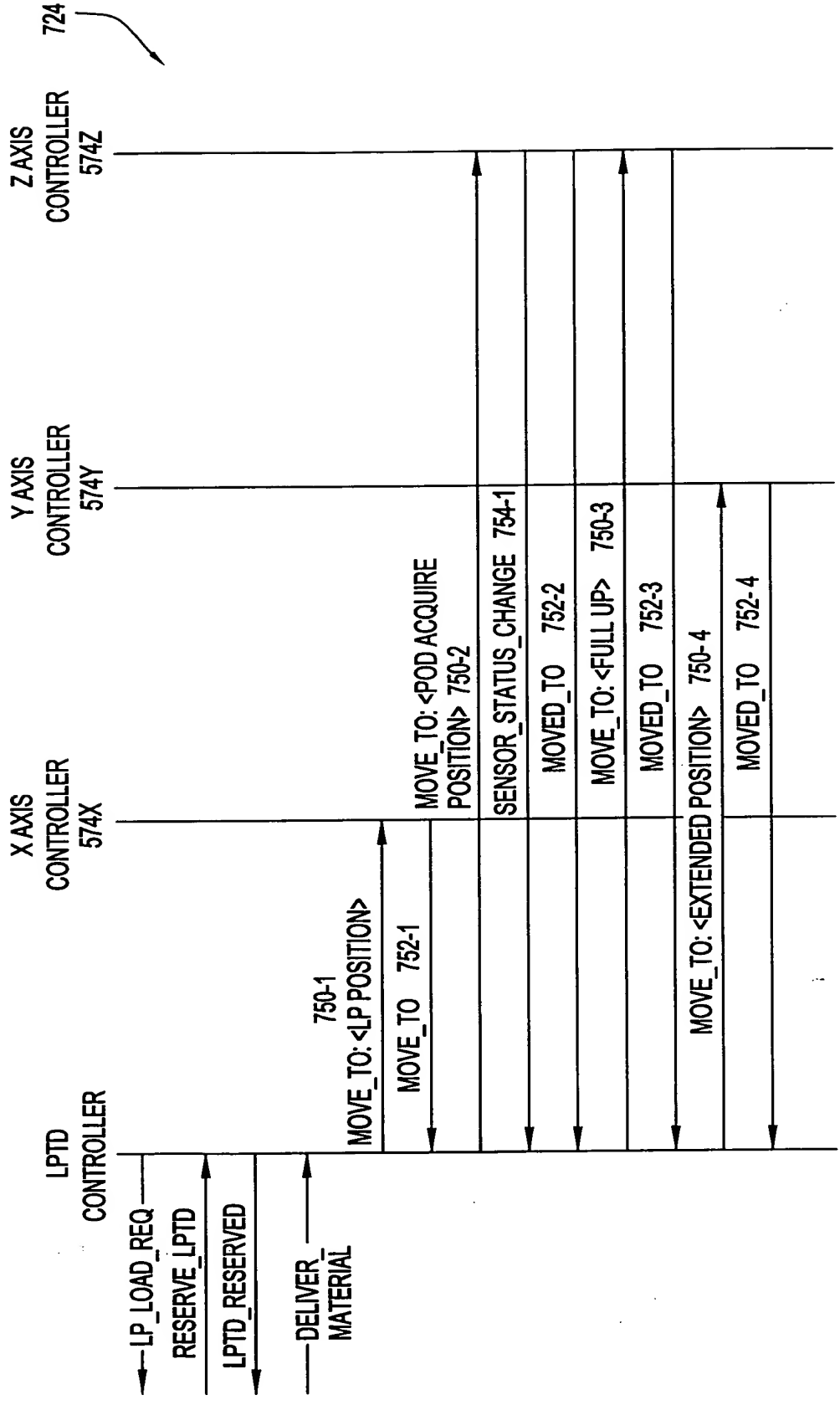


FIG. 24A

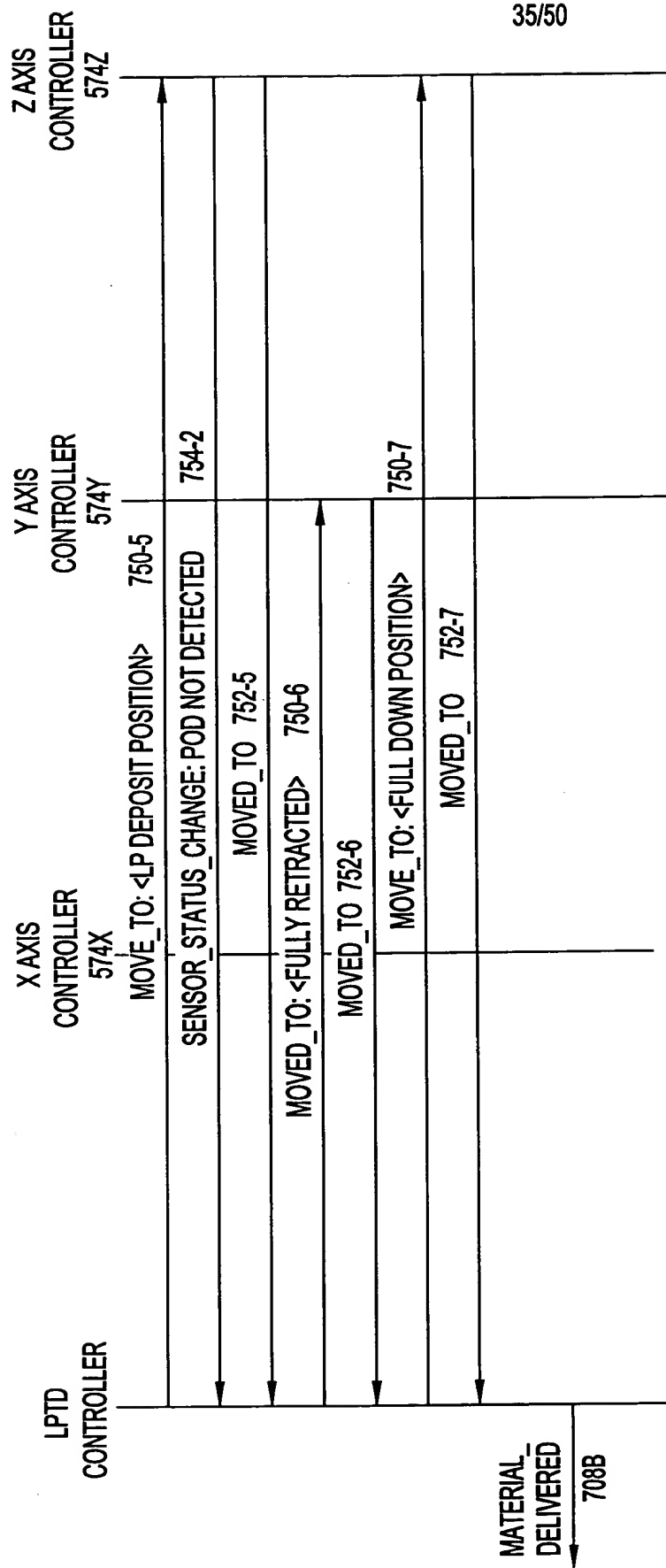


FIG. 24B

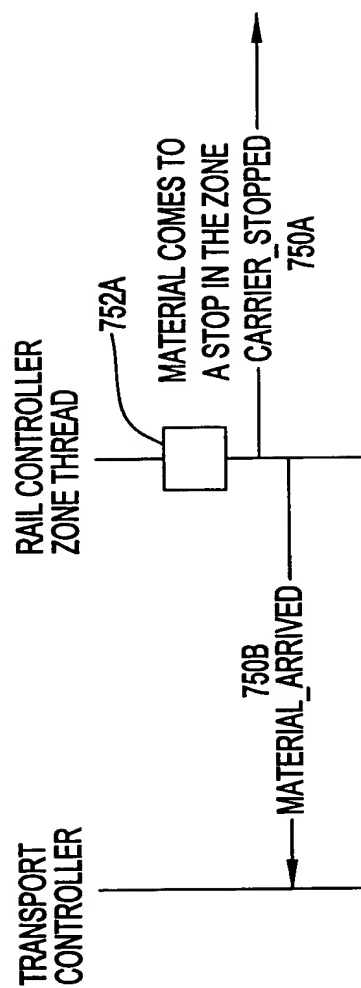


FIG. 25

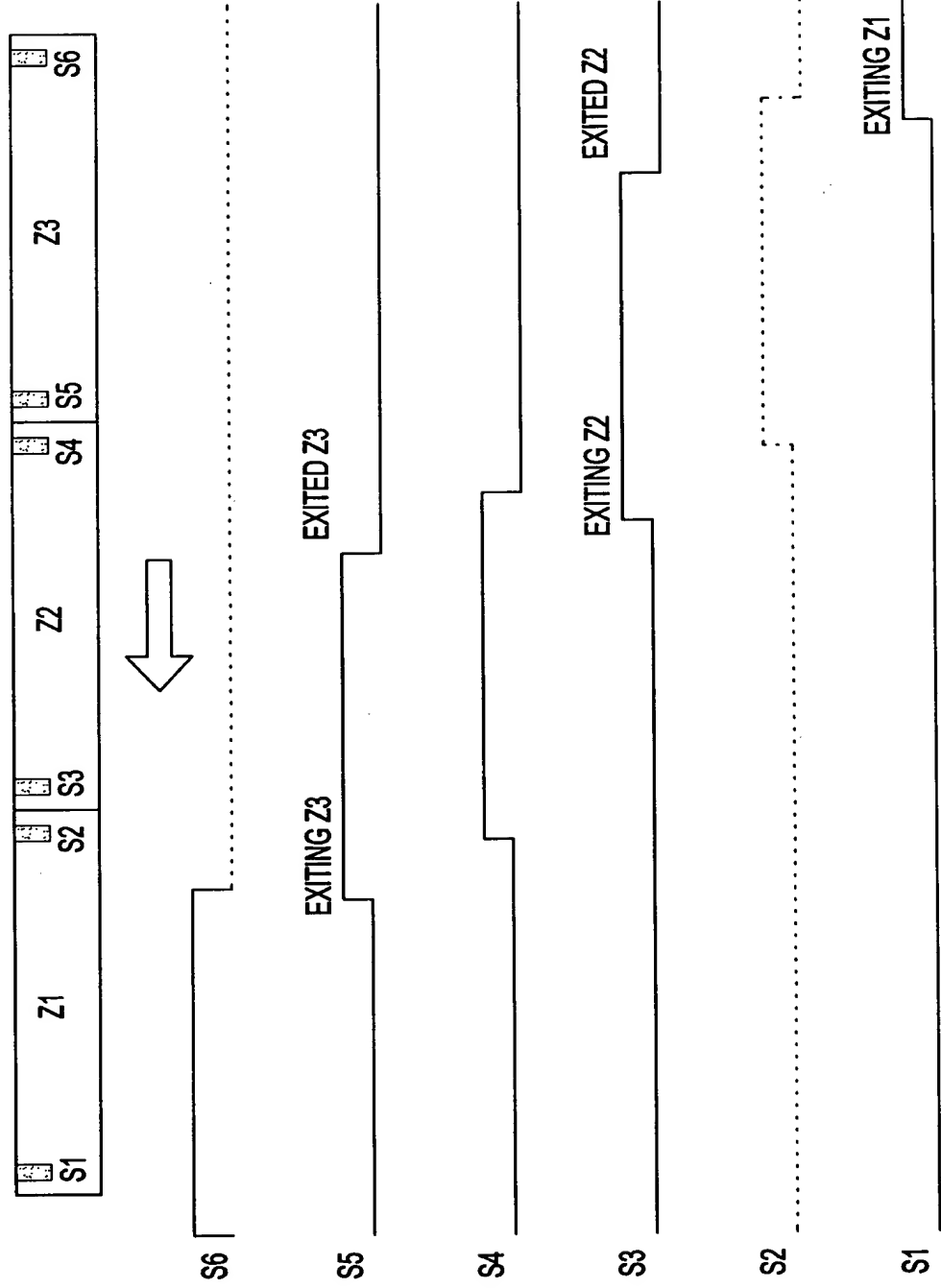


FIG. 26

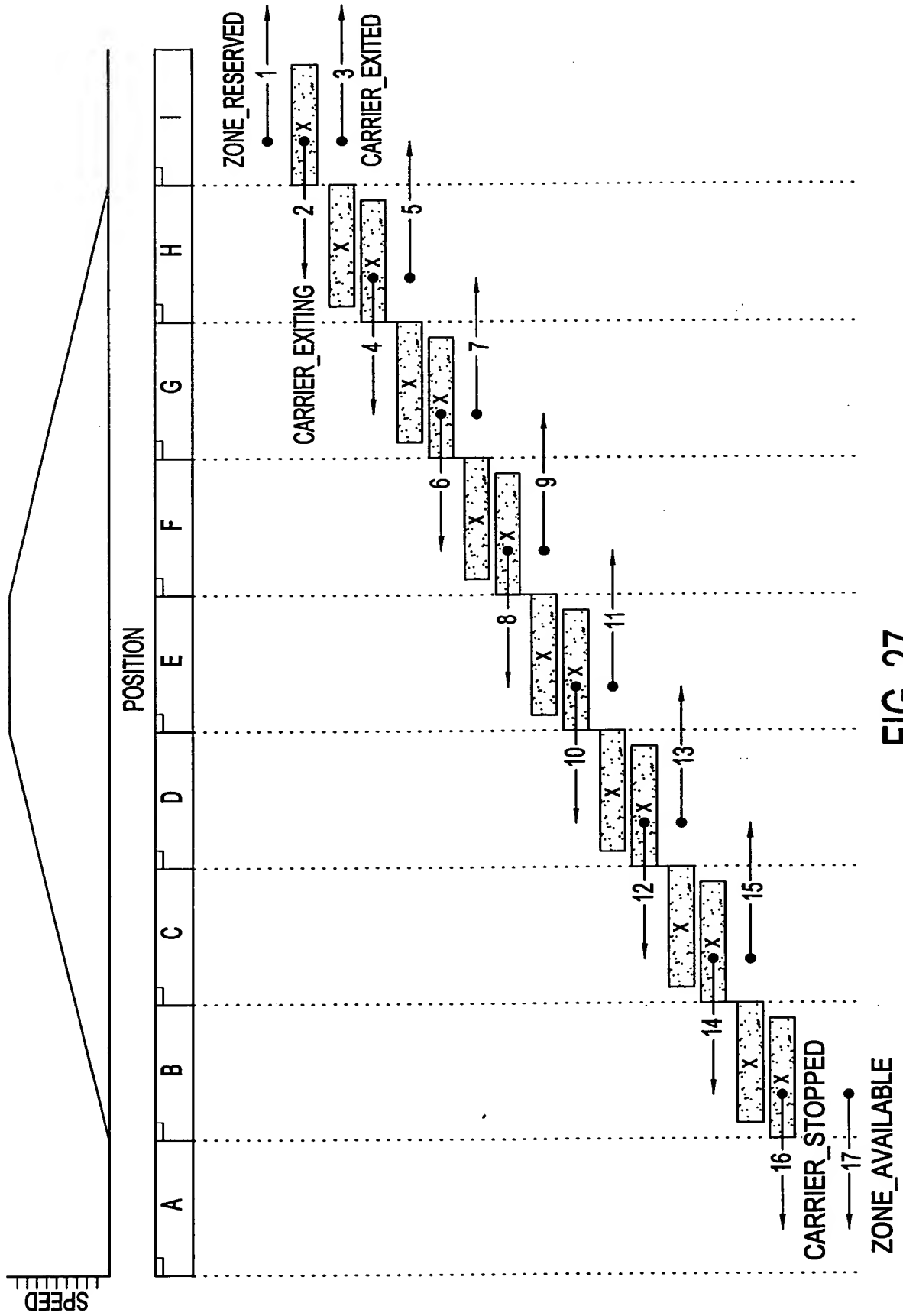


FIG. 27

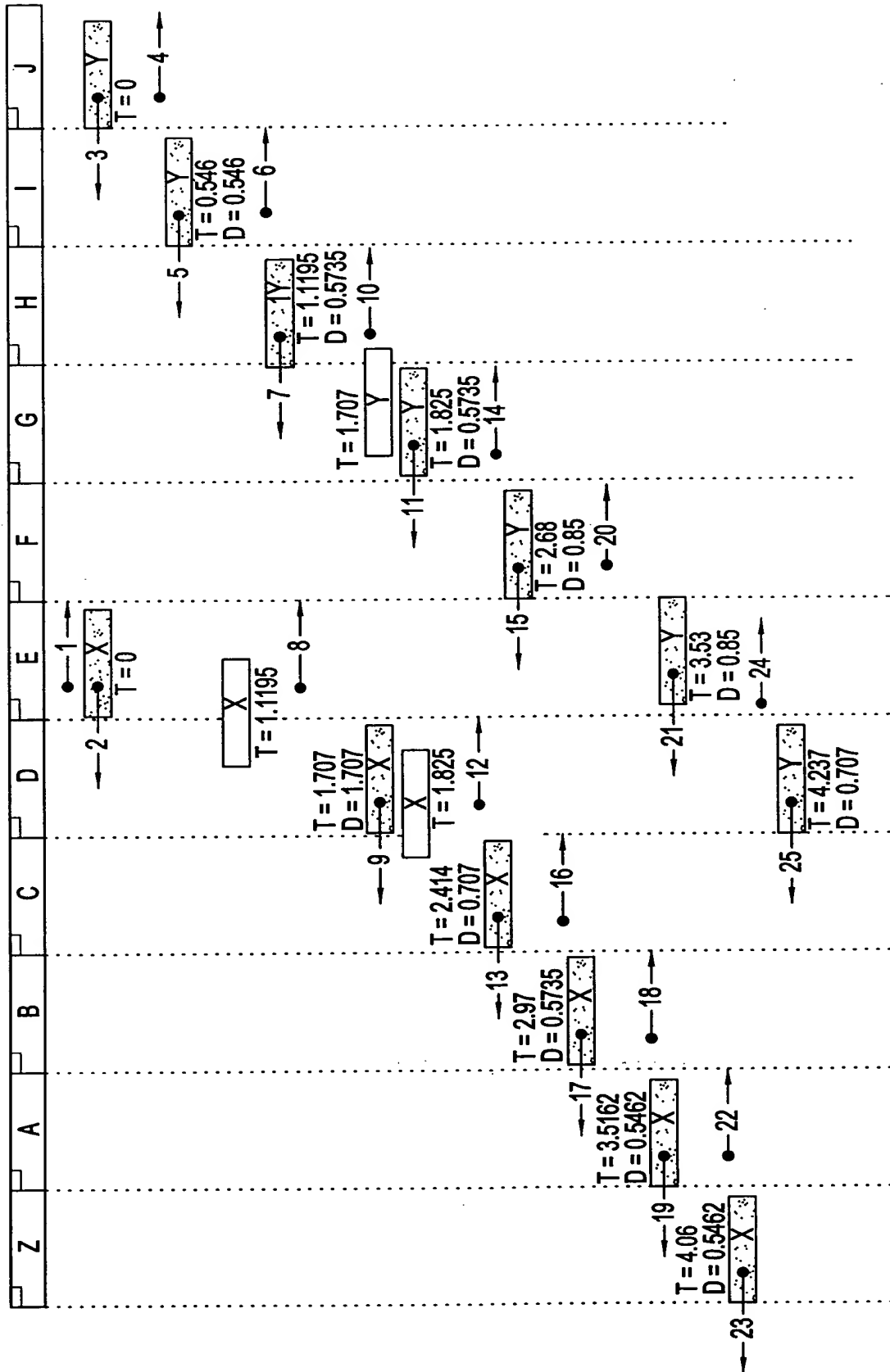
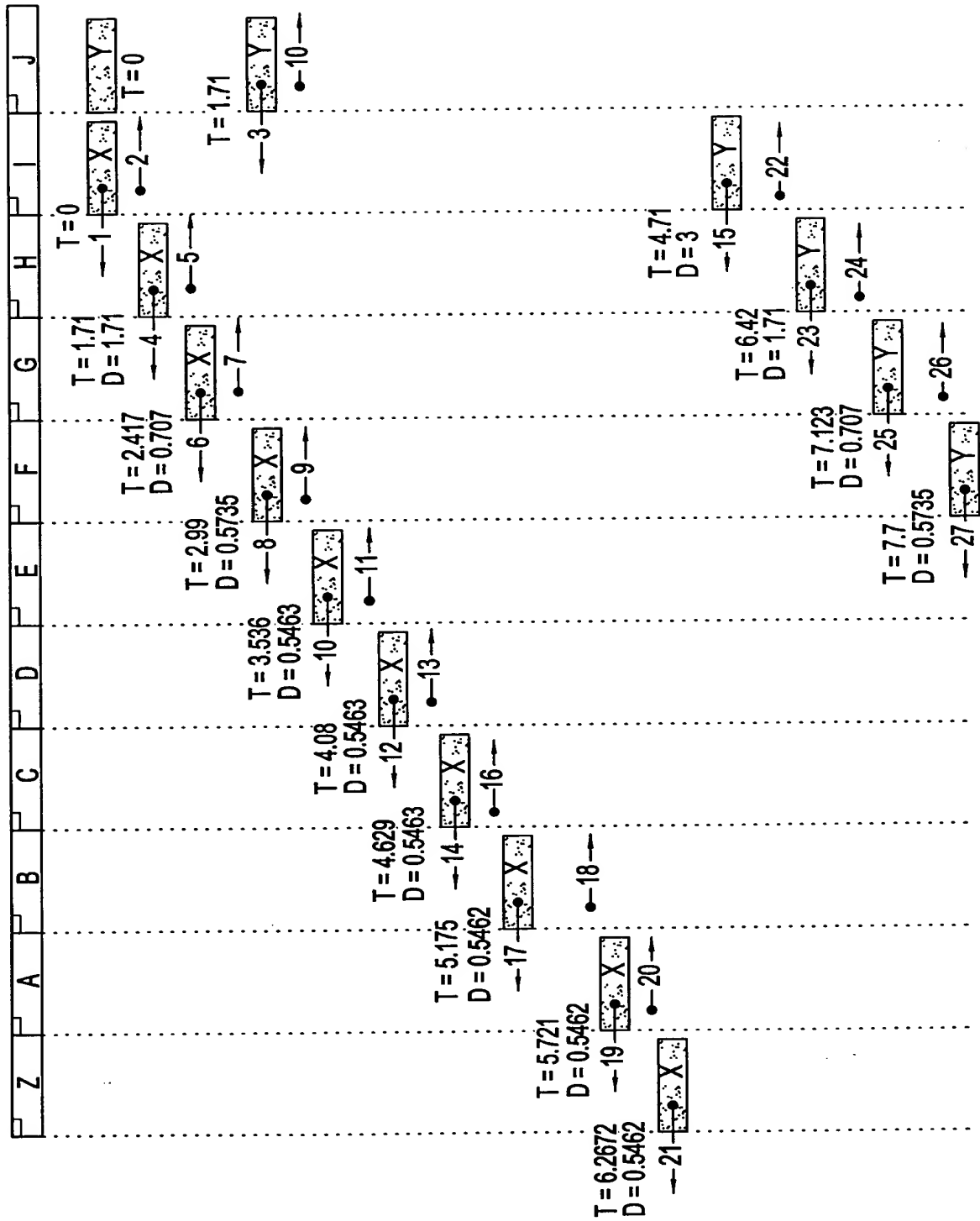


FIG. 28

FIG. 29



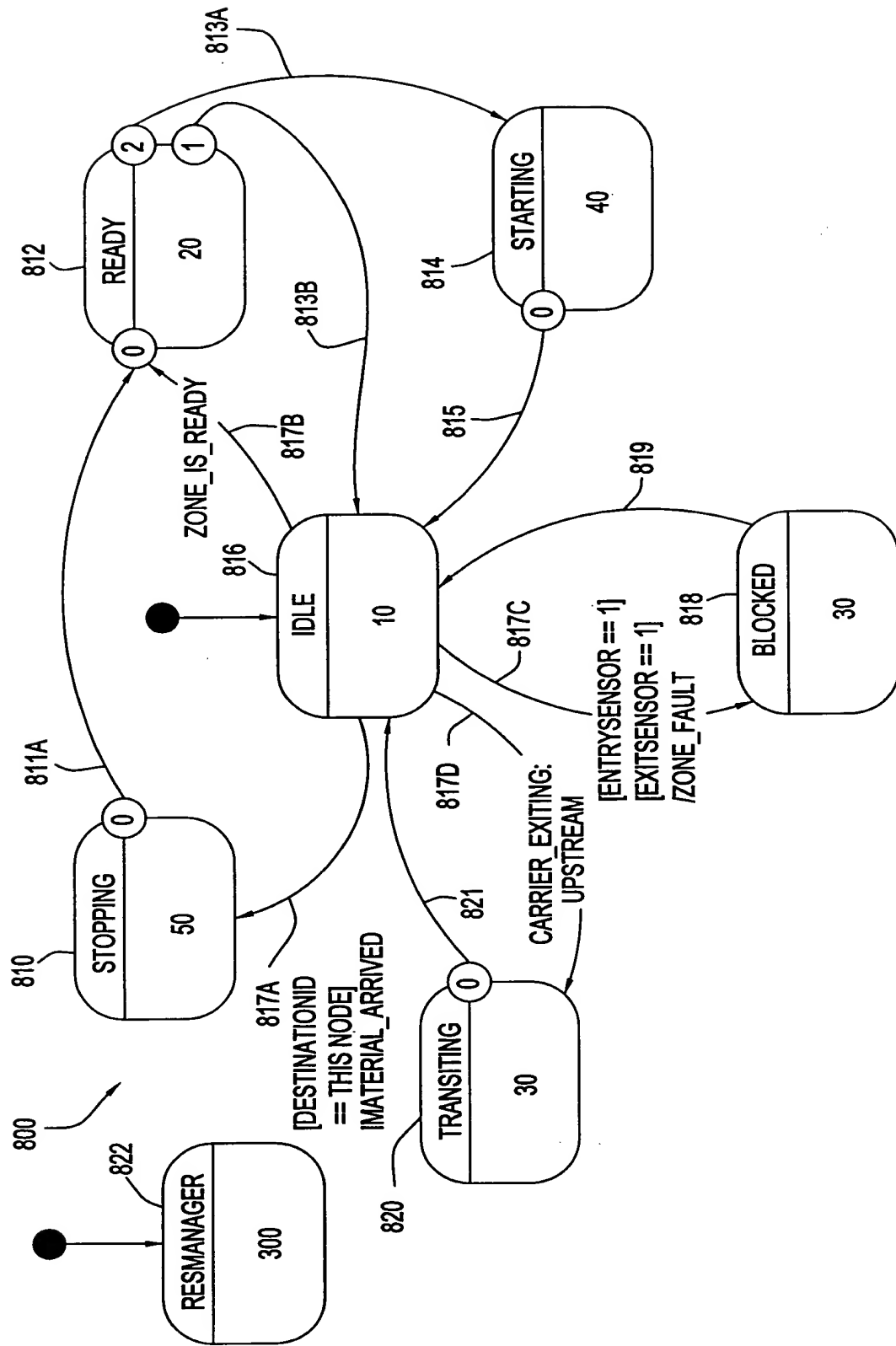


FIG. 30

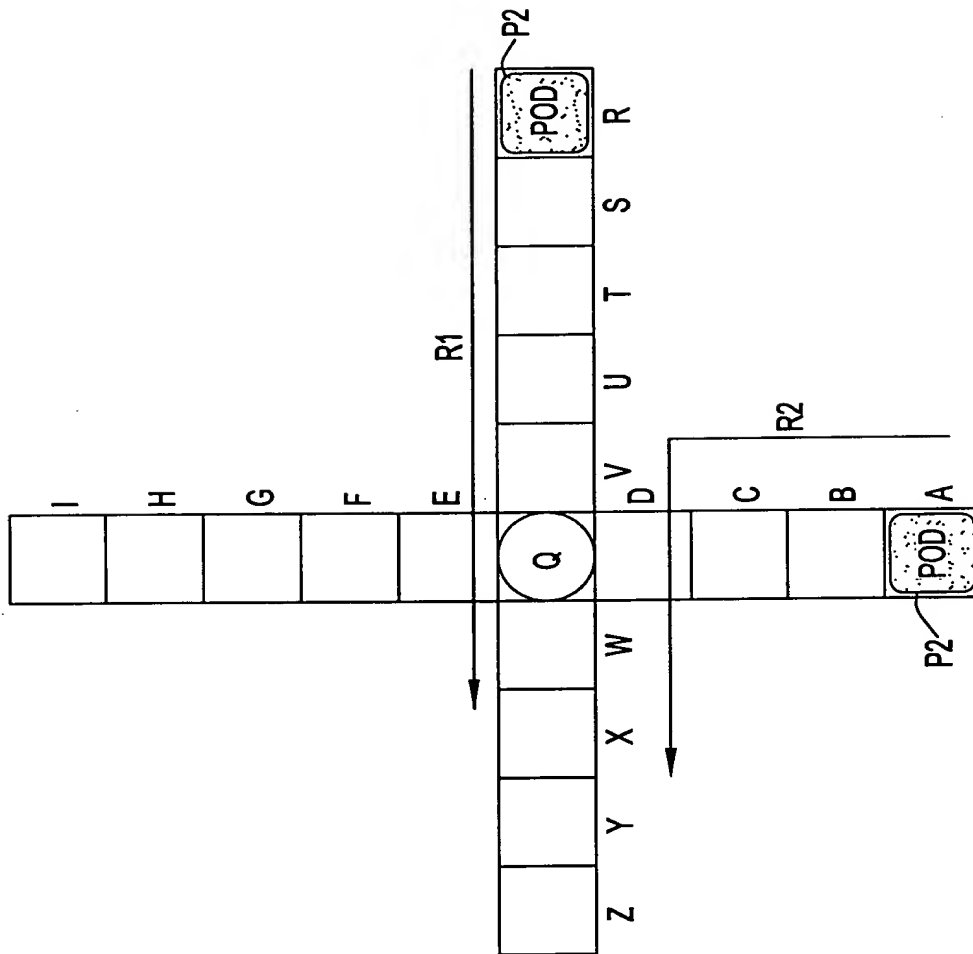
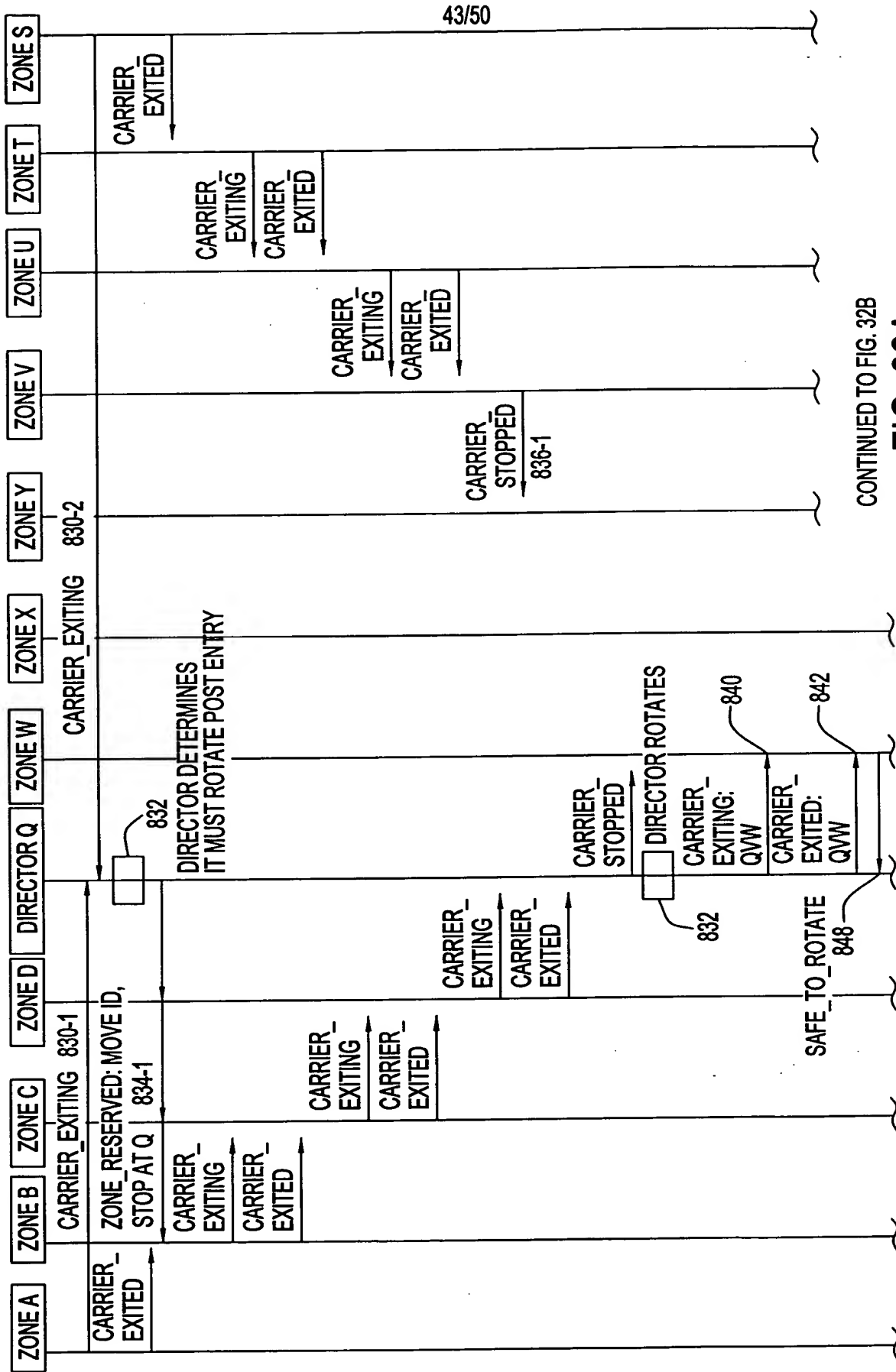


FIG. 31



CONTINUED TO FIG. 32B

FIG. 32A

ZONE_RESERVED: SECOND MOVE ID, NO STOP

CARRIER_ -
EXITED

CARRIER_...
EXITED

CARRIER_

**DIRECTOR ROTATES BACK TO
ITS HOME POSITION ZONE-
AVAILABLE: QDE**

EXITED

CARRIER_
EXITED:

844

FIG. 32B

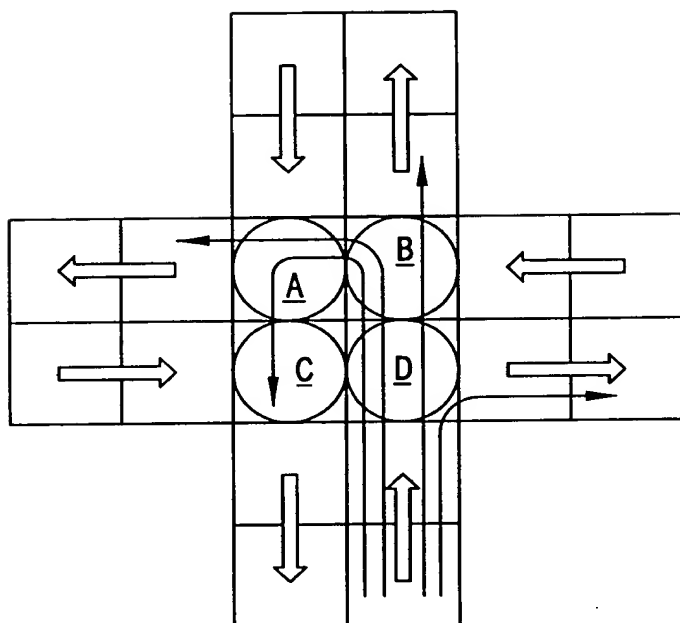


FIG. 33A

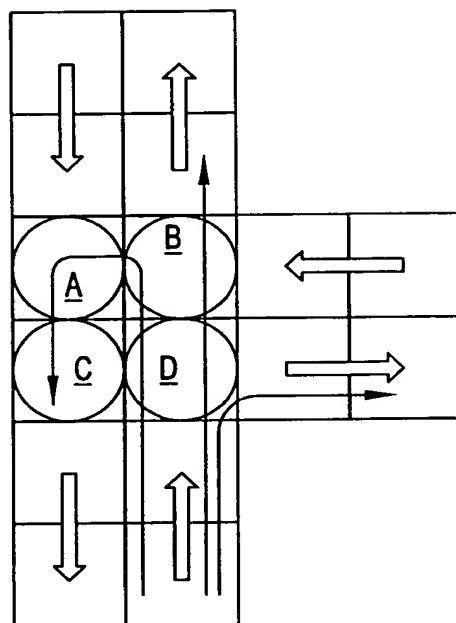


FIG. 33B

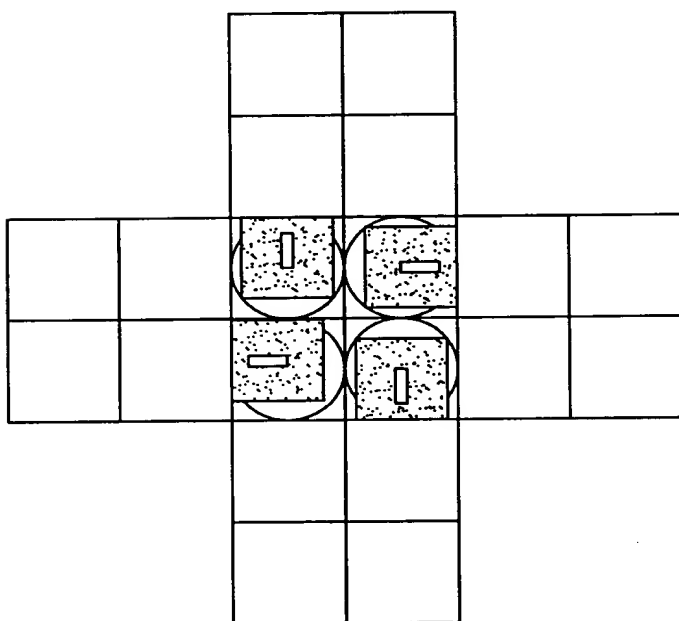


FIG. 33C

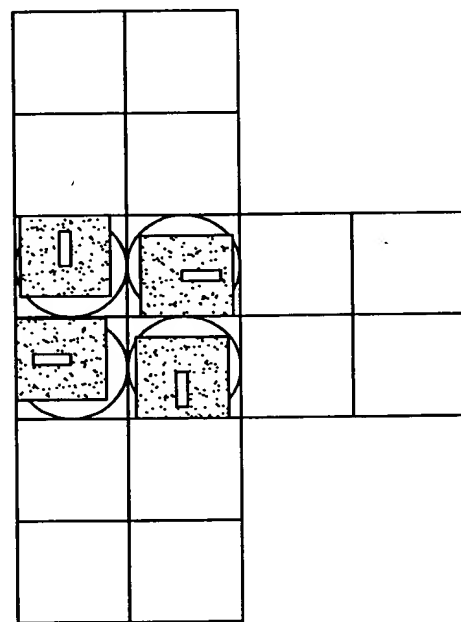


FIG. 33D

ROUTE DISCOVERY EXAMPLE:
PHYSICAL ZONE LAYOUT

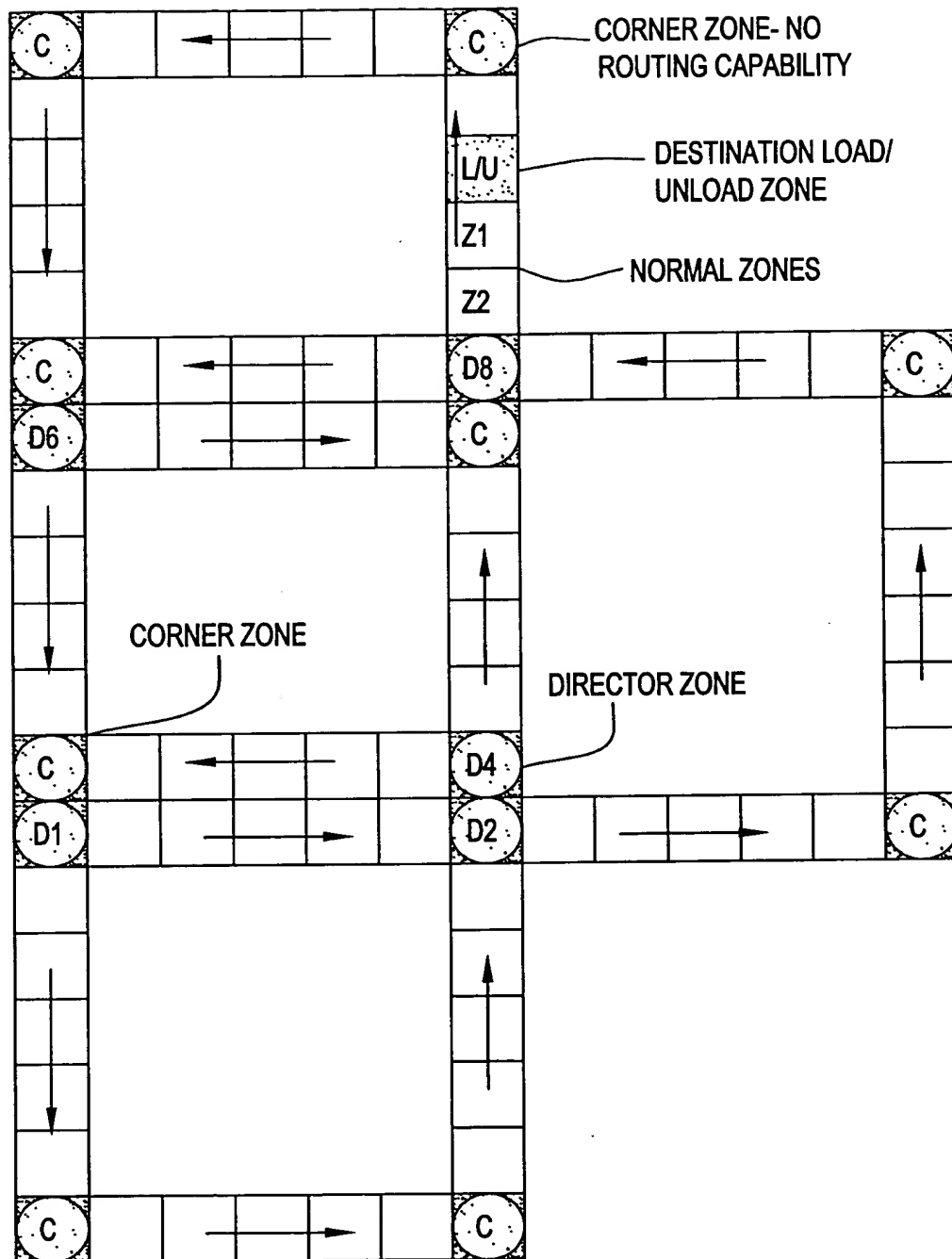


FIG. 34

ROUTE DISCOVERY EXAMPLE:
UPSTREAM ZONE CONNECTIVITY

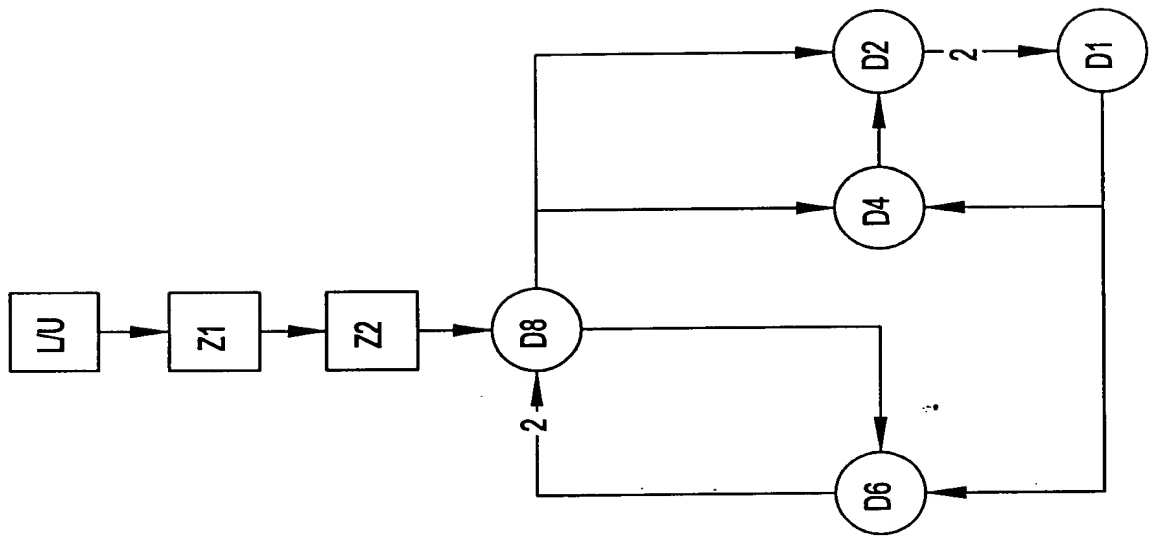


FIG. 35

ROUTE DISCOVERY EXAMPLE:
PHYSICAL ZONE LAYOUT

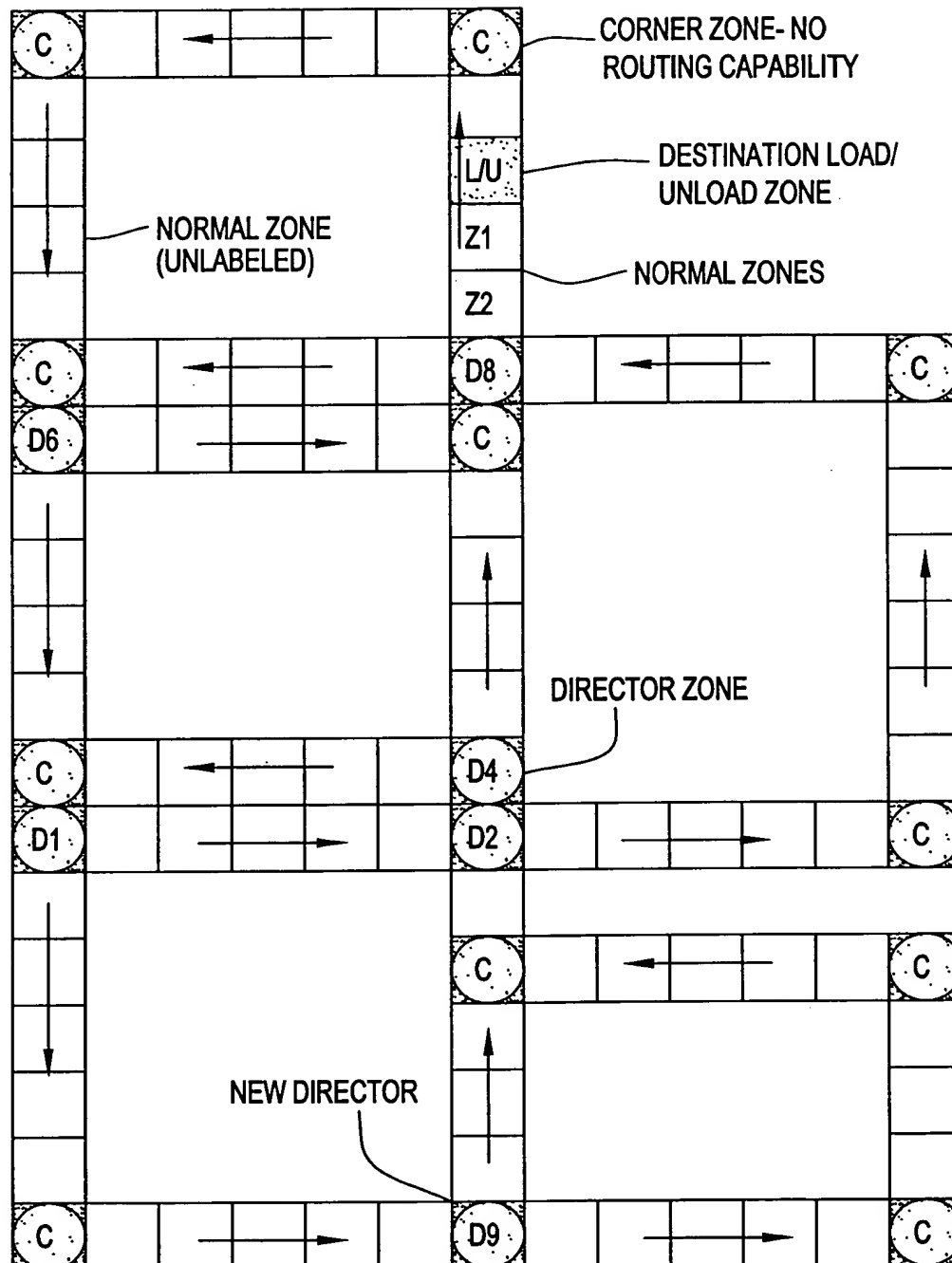


FIG. 36

FAILED NODE:
EXAMPLE LAYOUT

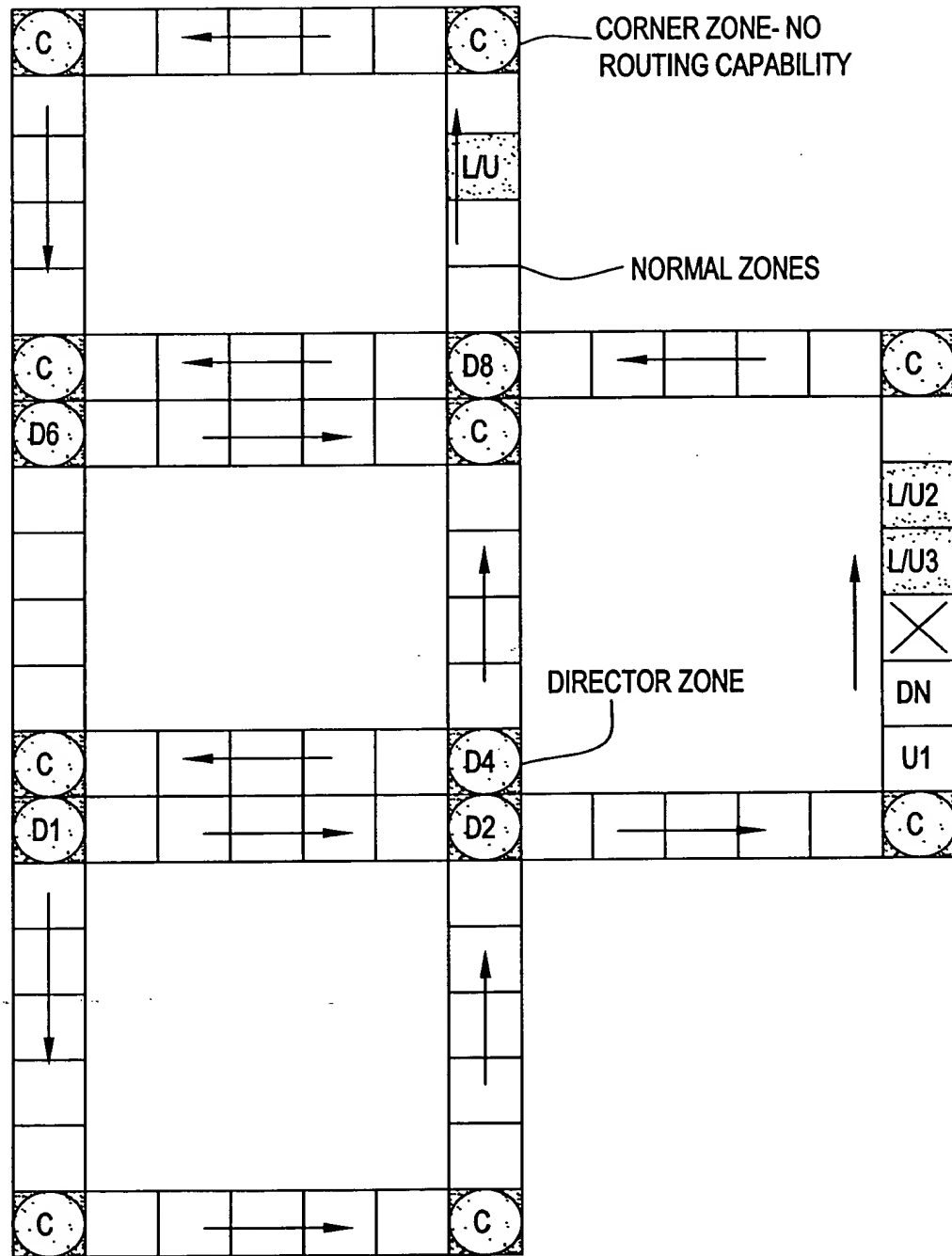


FIG. 37

FAILED DIRECTOR:
EXAMPLE LAYOUT:

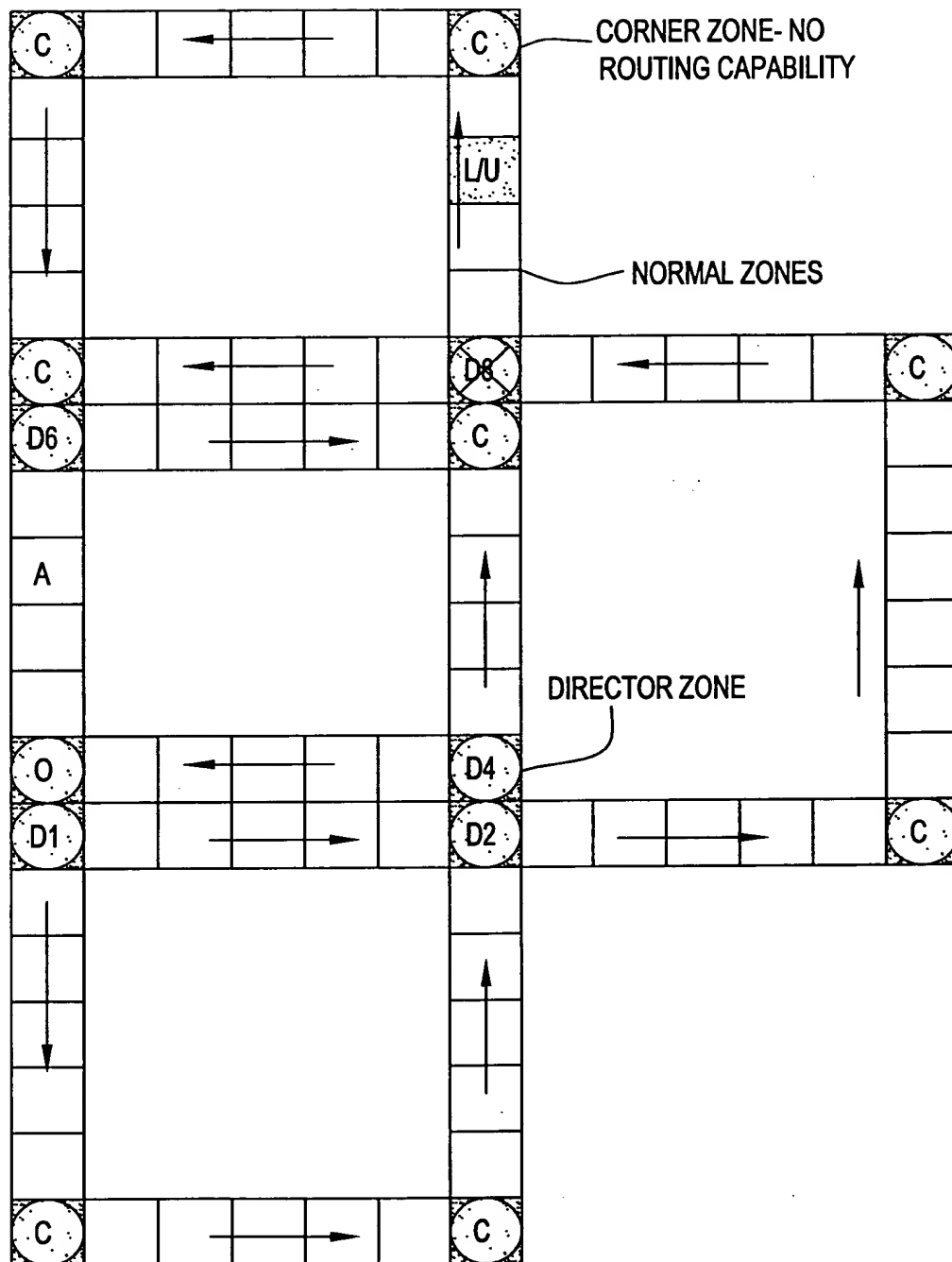


FIG. 38